Traumatized South African University Students

The way in which they interpret facial expressions

A research project submitted by Sarah van Olst in partial fulfillment of the requirements for the degree of MA by coursework and Research Report in the field of Community Counseling Psychology in the Faculty of Humanities, University of the Witwatersrand, Johannesburg, 5th December 2008.

I declare that this research report is my own, unaided work. It has not been submitted before for any other degree or examination at this or any other university.

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ABSTRACT

There has been a recent burgeoning of research exploring mechanisms involved in human facial affect recognition. Much of this research has tended to focus on emotion recognition, attributions, and perhaps on communication aspects. With the ever-increasing traumatization rates in South Africa, the question arises as to what potential impact victimization, and traumatization could have on facial affect recognition. The present study explored facial affect recognition accuracy differences between traumatized and non-traumatized students from the First Year Psychology classes at the University of the Witwatersrand in Johannesburg, South Africa. A sample of 632 students participated in this correlational study by responding to a series of questionnaires, and by rating the affect on a series of faces on the DANVA-2-AF. Results suggested that traumatized students were more likely to be anxious. However, while research suggests that anxiety is related to over-reporting of negative affect (such as fear, anger, and sadness) on the DANVA-2-AF, this finding was not replicated in this study. However, traumatized people with high anxiety levels were overall more likely to misinterpret the facial expressions, when compared with both non traumatized individuals and with traumatized individuals with low anxiety. Implications of the findings, as well as recommendations for further research are discussed.

ACKNOWLEDGEMENTS

I would like to thank my supervisor Esther Price for her vision and guidance in this journey. Secondly, this research would not have been successful without the love and support from my husband Marc. To illustrate his dedication to me and my career path, I add in the end of a poem that he wrote to me when I started my Masters in Counseling Psychology in the beginning of 2007:

PARABLE OF THE CHERRY BLOSSOM

"…hard toil borne on the fruits of future possibility

A new graciousness will be claimed

A new solace in a world of trials

Mother comfort for muddled minds…"

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1. Theoretical background

1.1 Introduction

Violence and crime continues to plague South Africa. It is so severe that the U.S State Department has identified South Africa as a critical crime threat location (South Africa Crime and Safety Report, 2007). As compared to the rest of the world, South Africa was ranked second for assault and murder per capita in a survey for the period 1998-2000 compiled by the United Nations Office on Drugs and Crime. The total crime per capita was 10th out of the 60 countries in the dataset (United Nations Office on Drugs and Crime).

Furthermore in September 2006, crime statistics were released from the South African Police Service. From March 2005 to March 2006, there were 18 545 murders and 20 553 attempted murders reported in South Africa. There were 54 926 reported rapes; 226 942 assaults with intents to inflict grievous bodily harm and 119 726 robberies with aggravating circumstances. Furthermore there were 12 825 car hijackings and 139 090 thefts out of or from motor vehicles. Added to this there were many crimes committed which were not reported (United Nations Office on Drugs and Crime; Centre for International Crime Prevention, 2006).

Consequently, most South Africans know about people or have themselves been victims of crime and violence. These crime statistics may result in people living in fear. Hearing details of a neighborhood hijacking is likely to sensitize a person to the possibility that he or she might be next in line. The person may then start to worry that they may be involved in a similar

threatening event (Butchart & Kruger, 1998). This future orientated mood state where one prepares to cope with an upcoming negative event is called "anxious apprehension" (Barlow, 2004).

Barlow (2004) explains the process of anxious apprehension. He states that there may be an evocation of anxiety – arising directly from a threatening event or indirectly from hearing about a threatening event. This may lead to negative affect where a person has a sense of uncontrollability or unpredictability. He or she then feels a need to prepare for something and physical and psychological reactions may result. Physically, a person's sympathetic nervous system may be aroused whereby an increased heart rate and rapid breathing may be experienced. Psychologically, a person may become hypervigilant as he or she now has a sense that the world is no longer a safe place. With this, a general mistrust of others and a feeling of loss in what was good may also occur. There is a particular shift in attention from the external, potentially threatening context to internal self evaluative content.

Barlow (2004) continues that a person who has anxious apprehension may start to interpret stimuli and events in a certain negative way. This is supported by researchers such as Derryberry & Reed (2002); MacLeod & Ruhterford (1992) and Campbell, Ebsworthy & Holker (as cited in Mogg & Bradley, 1998) who have reported a direct relationship between anxious people and their increased attention to negative stimuli as opposed to neutral stimuli. This, referred to as negative attentional bias, makes an anxious person feel more threatened.

This negative thought process is then exacerbated when a person looks for information in social settings that confirms his or her own perceptions. This selective type thinking is called confirmation bias (Higgins & Bargh, 1987). As such, people who have been affected by crime are likely to feel a certain amount of anxiety, which may lead to the development of confirmation bias. They may therefore search for and attribute negativity in the faces of those around them that may confirm their preconceptions of a threatening world.

Thus, for the present study:

Null hypothesis (H1): people who have experienced traumatic events will not have significantly different levels of state anxiety versus those who have not experienced traumatic events.

Alternative hypothesis (H2): Higher levels of state anxiety will predict the over reporting of fearful, angry and sad facial expressions.

Alternative hypothesis (H3): Higher levels of trait anxiety will predict the over reporting of fearful, angry and sad facial expressions.

Alternative hypothesis (H4): People with higher levels of state anxiety will evidence lower levels of accuracy in interpreting facial expressions.

Alternative hypothesis (H5): People with higher levels of trait anxiety will evidence lower levels of accuracy in interpreting facial expressions.

Alternative hypothesis (H6): State anxious people who have experienced traumatic events will be more accurate in identifying fearful, angry and sad facial expressions versus state anxious people who have not experienced traumatic events.

Alternative hypothesis (H7): Trait anxious people who have experienced traumatic events will be more accurate in identifying fearful, angry and sad facial expressions versus trait anxious people who have not experienced traumatic events.

There have been no previous studies of this nature. However there have been numerous studies on the relationship between anxiety and the interpretation of facial expressions which will be discussed in the next section.

In this dissertation, trauma, anxiety and facial expressions will be defined in detail to clarify concepts for the reader. The effects of exposure to violence will be explored. The dissertation's scope will further include whether or not people who have been exposed to traumatic events are anxious and whether or not they are attentive to negative stimuli. Furthermore, the way in which people interpret facial expressions of those around them will be discussed.

1.2. Rationale

This study aims to explore whether or not traumatized students are more likely to misinterpret facial expressions than are non-traumatized students. The study seeks to also establish whether anxiety mediates the relation between traumatization and facial affect recognition accuracy.

Facial expressions are meant to communicate people's intentions. Thus it is important in society for people to be accurate in recognizing other peoples' facial affect – so that they (the people perceiving the faces) may accurately attribute what is intended by others. Misinterpretation of a negative facial expression (such as anger) in another person would suggest that the perceiver possibly saw hostile intent and misattributed information communicated.

Research also suggests that people are more likely to behave in ways consistent with the "fight or flight" mechanism when they feel threatened. Hence it is important to understand the impact of anxiety and trauma on facial affect recognition as there are implications in understanding the social effects of the cycle of violence that pervades South Africa.

1.3. Literature review

The relationship between trauma and anxiety has been well established as is evident with the existence of post traumatic stress disorder (Coleman, 2006). These closely related concepts will be defined and discussed in the following two sections.

1.3.1. Anxiety

1.3.1.1. Defining anxiety

Anxiety may be seen as a complex pattern of three types of reactions to a perceived threat: motor responses (like a trembling voice or hands), physiological responses (like changes in heart rate and muscle tension) and lastly, subjective responses (like thoughts of danger when there is no danger) (Wicks-Nelson & Israel, 1997).

For the purposes of this study, anxiety will be defined as a future orientated mood state and adaptive mechanism for coping with trauma or threat of trauma (Speilberger, 1976). Speilberger adds that anxiety is widely regarded as a fundamental human emotion that has evolved over years as a coping mechanism.

Furthermore, literature states that two types of anxieties exist. They are: state anxiety and trait anxiety. The state-trait distinction in anxiety was originally discussed by Speilberger and Diaz-Guerrero (1976). They say that trait anxiety is relatively stable individual differences in anxiety proneness. It is reported that persons who have a high trait anxiety are more strongly disposed to perceiving their environments as more dangerous than are people with low trait anxiety. On the other hand, state anxiety is defined as a temporary form of anxiety related to a particular situation or condition that a person is currently in (Coleman, 2006). Little work has been done on state versus trait anxiety and the interpretation of facial expressions (Eysenck, 1992).

1.3.1.2. Anxiety and trauma

Research has found that different levels of exposure to traumatic events result in different prevalence rates of anxieties.

Schlenger, Caddell, Ebert, Jordan, Rourke and Wilson (2002) found that the prevalence of post traumatic stress disorder (PTSD) was significantly higher in the New York area than in the Washington, DC, area or other metropolitan areas after the September 11th attacks had taken place in 2001. Galea, Ahern, Resnick, Kilpatrick, Bucuvalas and Gold, (2002) who also researched the effects of the event reported a prevalence of PTSD of 7.5 % among metropolitan

New Yorkers, and a 20% prevalence rate among New Yorkers living below Canal Street – an area extremely close to where the twin towers used to stand. Both Schlenger et al. (2002) and Galea et al. (2002) concluded that individuals directly exposed to the attacks were more likely to develop an anxiety disorder, namely PTSD.

However in a similar study, Shalev, Tuval-Mashiach, and Hadar (2004) found no relationship between exposure to trauma and rates of PTSD in their study of two suburbs in Jerusalem. Both suburbs where chosen due to their similar demographics and distance from Jerusalem. Efrat had a high incidence of road – side shootings whereas the suburb of Beth Shemesh did not. In assessment, Shalev et al. (2004) included items relating to indirect exposure to trauma such as being forced to evacuate one's home. The authors also included items assessing direct exposure such as being shot at or witnessing a gunshot injury. Residents of Efrat experienced three times more exposure than Beth Semesh residents; however the prevalence of PTSD was not significantly different. Twenty five percent of people from Efrat and 19 percent of individuals from Beth Shemesh met the criteria for PTSD. Thus the authors concluded that individuals who were more exposed to ongoing traumatic events were not significantly more vulnerable in developing an anxiety disorder, namely PTSD, than those individuals who were exposed to less ongoing traumatic events.

The discrepancy between findings of Schlenger et al. (2002) and Galea et al. (2002) versus Shalev et al. (2004) suggests that the impact of ongoing traumatic events may differ from the impact of isolated traumatic events or other disasters (Rosenberg, Heimberg, Solomon & Levin, 2008). In other words, it may be suggested that one large, unexpected traumatic event may lead

to the development of PTSD whereas a person exposed to ongoing traumatic events would not necessarily develop this anxiety disorder. It is also proposed that traumatic events do not dictate an increase of rates of traumatization as people may become accustomed to the events.

In a study by Rosenberg , Heimberg, Solomon and Levin (2008) the authors investigated whether individuals with a greater level of exposure to trauma or trauma symptoms would have heightened levels of anxiety. The authors surveyed students from Tel Aviv University and from the College of Judea and Samaria in Ariel. The mean age of the sample was in the high 20s and there was relatively equal balance in gender of participants. Rosenberg et al. (2008) used the Exposure to Terror Questionnaire (Lavi, 2004). Items included: "Someone close to me was injured in a terror event" and "I have been shot at." Participants also had to answer questions from the Impact of Events Scale-Revised and would have given researchers information about frequency of intrusive thoughts, avoidance behavior and hyperarousal. The authors concluded that for the university students in Ariel, exposure to terror was related to anxiety and hostility. Similarly, in a study conducted by Ronen, Rahav and Appel (2008 in press) it was found that participants with higher trait anxiety reported a higher level of state anxiety, more symptoms and a higher increase in fears after experiencing trauma related to terrorist attacks.

1.3.2. Trauma

1.3.2.1. Defining trauma

The trauma victim may be defined as any person who has been the victim in terms of robbery; physical assault; sexual assault or forced unwanted sexual activity of any kind; motor vehicle accident; car hijacking; death of a loved one through accident; homicide or suicide; combat

participation and injury from natural or manmade disaster as described by the Traumatic Stress Schedule (TSS). It also includes the participant witnessing any of these traumas being experienced by a close friend or family member.

In applying this definition of trauma, a study is discussed. In his research, Hoffmann (2002) used the TSS and aimed to quantify the number of traumatic events experienced by Technikon Pretoria students in the preceding year and to record the types of trauma symptoms reported as a result of these traumatic events. He used a sample of 183 females and 61 males (n=245) and administered the TSS where participants could indicate what traumatic incidents they had experienced. He found that 70 percent of the sample reported one or more traumatic events during the preceding year. The most frequent traumatic event categories were witness to injury or death, the death of a loved one and negative change in life circumstance. Another important finding was that female students reported a high incidence of unwanted sexual activity. The least frequent traumatic events consisted of experiencing natural disaster and motor vehicle accidents. In terms of trauma associated symptoms, it was found that intrusive thoughts, specifically amongst female students, were the symptoms most reported after a traumatic event.

Furthermore, in a hospital based study on injury and violence in Johannesburg, Butchart and Brown (1991) found that age and gender-related trends emerged in terms of experienced trauma. The highest risk of victimization seemed to occur among males aged 15 to 30 where men were equally likely to be attacked by strangers and by acquaintances. The women who were between the ages of 15 and 35 also had a very high risk of being victimized. Nearly 40 percent of women were attacked by spouses and lovers, and a further 32 percent by acquaintances. Unfortunately

this study only focused on one traumatic event category, namely physical attack, but still is relevant for the current study as it indicates that young adults, such as university students, appear to be vulnerable towards victimization.

Quantifying crime is essential in research but it is also vital that we explore the subjective experiences of a crime. It is important to note the difference between a crime and a traumatic event. Thus a hijacking in itself is not a trauma – it is a crime. However if the person experiences the event with shock, horror, helplessness and a physiological, adrenal response, then the crime may be subjectively experienced as a traumatic event (Barlow, 2004).

1.3.2.2. Threat: a possible effect after experiencing a traumatic event

Threat is referred to as an individual's perception of a situation as more or less dangerous or personally threatening to him or her (Spielberger & Diaz-Guerrero, 1976).

Research has highlighted the role of subjective appraisal in individuals who have experienced or witnessed violence, suggesting that people are more likely to feel threatened even if there is no real threat (Speilberger & Diaz-Guerrero, 1976). Perception and subjectivity take into account the fact that people attribute meaning to experiences.

The appraisal theory (Schachter & Singer, 1962) proposes that it is the interpretation of an event as opposed to the event itself that causes particular emotions to occur. Thus a cognitive process is involved. Janoff-Bulman (1983) contributes to this field by writing about distress suffered by victims who are psychologically unprepared for such unusual occurrences of traumatic events.

Hence their victimization does not conform to their expectations on the assumptions that they have about themselves or the world. The way they see and think about the world has been challenged and may not be viable any longer. Traumatic events may shatter their assumptions. It may also change their belief of their own vulnerability; their perception of their world as meaningful and the perception of themselves as positive. Thus assumptions that used to allow someone to function effectively may no longer serve as a guide for behavior and this state of disequilibrium may result in feelings of anxiety.

There are also physiological changes related to threat and the two factor theory of emotion (Schachter & Singer, 1962) is used to explain this further. Schachter and Singer (1962) state that emotion consists of two components: cognition and physiological arousal. According to this particular theory, cognition is used to interpret the meanings of particular situations and physiological responses. As cognitions are influenced by a situation, the theory predicts that elements within a person's environment can have a significant impact upon their emotional state, as long as the reasons for any physiological arousal are ambiguous.

To illustrate this theory, in a study conducted by Schachter and Singer (1962), a group of 184 university students was given one of two injections. Respondents either received a placebo which resulted in no side effects or they received adrenaline which resulted in increased heart rate, perspiration and breathing. Respondents were divided into three groups. The first group was told of the side effects of adrenaline. The second group was told incorrect information: that the injection would cause numbness and a headache. The last group received no information regarding the injections. The next part of the study was to leave the respondents in a room with a

researcher who was pretending to be a subject. This accomplice behaved in a playful or an angry manner. Subjects who were told the incorrect information about the injection or those who were given no information behaved similarly to the accomplice, taking cues from the situation to interpret their arousal level to determine their emotional state. Subjects who were informed correctly about the side effects of the injections did not manifest emotion mirroring the accomplice. Thus people's cognitions depended on the information they received from their environments and so their physiological states were influenced.

Schachter and Singer (1962) explain their study by stating that an individual will perceive a stimulus, will simultaneously feel physiological arousal and will have a cognitive process. In relating this to a relevant example, an individual who has experienced a threatening event such as a street mugging may see a man walking towards him on a street (stimulus). Upon seeing this man, the individual may start feeling an increased heart rate (physiological arousal) and may think "I'm anxious" (cognition). This could result in the person experiencing anxiety and the emotion of fear.

In conclusion, it may be the interpretation of an ambiguous event or stimulus that causes one to feel physiological arousal, to have a cognitive process and to feel an emotion. This emotion will then affect the ways in which we relate to other people in social settings.

1.3.2.3. Mistrust: a possible effect after experiencing a traumatic event

A typical effect of a traumatic experience is to feel threatened. This can change a person's sense of security and trust in the world and others. Experiencing a house robbery, a physical attack or

eviction, for example, can lead to feelings that nothing will be safe again and may cause a person to be suspicious of other people (Gibson, Swartz & Sandenbergh, 2007). Assigning this meaning of mistrust into one's life may have effects on one's interpretations of social and interpersonal relationships.

Being mistrustful or feeling threatened by others could lead to a person misinterpreting the emotions and facial expressions of others. One way in which to understand this is to consider Freud's theory of projection. Freud proposed that people engage in a process called projection. This involves attributing your own unacceptable feelings, thoughts and desires onto someone other than yourself (Freud, 1936). This process also indicates that the person, who is projecting, has a presumption that he or she shares a similarity with the person onto which he or she is projecting. One may propose that an anxious person projects his or her own fear onto another person and could therefore interpret that person's face as fearful.

In a recent study conducted by Maner, Kenrick, Becker, Robertson, Hofer, Neuberg, Delton, Butner and Schaller (2005), the authors examined emotional projection. They wrote that this type of projection is one in which arousal of a certain motivational state leads people to perceive emotions in others that are not specifically identical to their own, but that are related in function to their own motivational states. They labeled this "functional projection". In other words, fear is associated with a self-protective motivational state. If a person feels threatened and develops a self-protective motivational state, he or she may then project this onto other people. So an emotion and a motivation are intrinsically linked.

The authors continue by stating that an activation of an emotion can shape the way people attend to, encode, and interpret information about others. Social perceptions can be influenced by one's emotions and perceptions of other people's emotional states. Individuals can "read" faces and infer other people's emotional states from specific expressions. Therefore people can gain information from others' faces and can tell if others intend to harm them or to be friendly towards them (Maner et al., 2005).

Maner et al. (2005) say that when a specific emotion (fear and anxiety) and its motivational state (self protection) is aroused, the perceiver may be especially likely to detect in others' faces these emotions and states. This may be because a failure to identify an actual threat is generally a more costly error than the assumption of threat when none exists, and so there may be a tendency to perceive fear or anger even in the absence of any clearly fearful expression.

The authors conclude that motives pertaining to survival influence social perception. These motives lead people to project emotions on the people around them and cause people to see more emotion in facial expressions when they are feeling threatened (Maner et al., 2005).

1.3.3. Facial expressions

In the present study, the emphasis is placed on the meaning of facial expressions as opposed to the creation of facial expressions. In addition, it is the meaning gained by the observer that is relevant. According to the literature, there are also many aspects to the concept of facial expressions that are controversial and so, for the purpose of the study, these are clarified as follows:

Firstly, facial expressions result from one or more motions or positions of the muscles of the face (Rosenberg, 1995). The Facial Expression Coding System (FACS) published by Ekman and Friesen in 1976, allows for facial expressions to be systematically categorized in terms of each muscle movement involved in making each facial expression (Ekman, 2005). These facial movements convey the emotional state of the person to the observer. They are also a type of nonverbal communication and are primary means of conveying social information among people. Even though the FACS is important in understanding the basic concepts of facial expressions, it is beyond the scope of this research.

Another important aspect in defining a facial expression is that it is linked to emotion. As expressions and emotions are intertwined, facial expressions are more often involuntary (Ekman, 2003). It can be nearly impossible to avoid the expression of certain emotions, even when it would be strongly desirable to do so. Brief expressions, referred to by Ekman as micro expressions, are an important source in revealing an emotion that a person is trying to conceal. Thus emotions are activated and publicly expressed in facial expressions prior to conscious or self-reflective awareness of what one is feeling (Tait, 2005). The link between emotion and expression can also work in the opposite direction: it has been reported that voluntarily assuming an expression can actually cause the associated emotion (Ekman, 2003).

Thirdly, it will be assumed that facial expressions are universal. The first major scientific study of facial expression was published by Charles Darwin in 1872. In his book entitled *The Expression of Emotion in Man and Animals* (1872) Darwin wrote about observed consistencies in non verbal postures and emotional expression across many species of animals, including

humans. More specifically he pointed out that in humans, emotional expressions are similar at different ages. Infants express emotions in much the same way as adults, before the necessary learning required for a particular expression can possibly have taken place. He strengthened his argument by reporting an intriguing observation. Darwin said that subtle, emotional expressions as represented in facial expressions are the same in those born blind as in those who are normally sighted, and that a large amount of emotional expressions are presented across different cultures and races (David & Barlow, 2004). Darwin concluded that many expressions and their meanings, such as astonishment, shame, fear, horror, pride, hatred, wrath, love, joy, guilt, anxiety, shyness and modesty, are universal. Darwin stated "I have endeavored to show in considerable detail that all the chief expressions exhibited by man are the same throughout the world" (Darwin, 1872 pp 121).

In the 1950s, Paul Ekman (as cited in Ekman et al., 1969) picked up on Darwin's work and proceeded to explore facial expressions and affect. He realized that people may have learned the meaning of facial expressions by watching television or by having contact with other people so he decided to conduct his research by entering the South Fore culture of the people who lived in the isolated areas of Papau New Guinea. There would have been little external influence on the South Fore people and so Ekman concluded that this would be a good sample for his research.

He worked with two groups: 189 adults and 130 children made up the first group and the second consisted of 23 members of a culture who lived a less isolated lifestyle than the South Fore people. Ekman observed all the members' facial expressions during their daily lives, and recorded their faces while they were listening to stories read by researchers. In these exercises,

most members in all groups picked the facial expression that correctly matched the emotion evoked by the narrative. From most research in Papau New Guinea, results concluded that facial expressions were more than likely universal (Tait, 2005).

In more recent work, Ekman, Sorenson and Friesen (1969) supported these findings by showing photographs to people in five cultures – United States, Argentina, Brazil, Chile and Japan. The researchers asked the participants to judge what emotion was shown in each facial expression. The majority in every culture agreed, suggesting that facial expressions may be universal. A comparable study in other cultures was conducted by Carrol Izard (1971). She found similar results.

Furthermore Ekman, Wallace, Friesen, O'Sullivan, Chan, Diacoyanni-Tarlatzis, Heider, Krause, Ayhan, Pitcairn, Ricci-Bitti, Scherer, Tomita and Athanase (1987) presented evidence of cross-cultural agreement in the judgment of facial expression. Subjects in ten cultures made up the groups for the study. A certain task allowed them to indicate that multiple emotions were evident in a set of facial expressions. It also allowed them to state the intensity of each emotion. Agreement was very high across cultures about which emotion was the most intense. The ten cultures also agreed about the emotion signaled by an expression.

Lastly, this relationship between facial expressions and cultural differences is an important aspect for this study. Ekman (2003) states that despite there being universal expressions, “display rules” exist. These are informal, nonverbal forms of etiquette about socially acceptable ways to use and control expressions. For example, it is why in most public sporting contests the loser

does not show the sadness and disappointment he or she feels. Furthermore in a study conducted by LaBarre (1947), Samurai women were reported to smile rather than to cry upon hearing that their loved ones had died in battle. Although such observations have been taken as evidence of cultural variability in the meaning of smiles, these smiles may not have been signs of grief, but may rather have been culturally required masks implementing the display rule to show joy and hide distress in this public situation.

These display rules may dictate that we diminish, hide completely or mask the expression of emotion we are feeling. Ekman tested this formulation in a study that showed that when alone Japanese and Americans displayed the same facial expression in response to seeing movie clips of accidents and surgical operations. However when a scientist sat with participants as they watched the movie clips, the Japanese more than the Americans masked negative emotions with a smile. In private they showed innate expressions; in public, managed expressions (Ekman, 1972). Similar research in South Africa would be invaluable in the research of non verbal communication and the interpretations of facial expressions.

Even though Ekman has explained his ideas about facial expressions being universal and slightly different in each culture because of socially learnt display rules; the other side of the argument is that facial expressions are not innate or universal and that they are, like language, very specific to culture. Researchers such as Birdwhistell (1970) and various other anthropologists have endorsed cultural relativity arguing that the meanings of expressions are arbitrary and specific to culture (Nowicki, Glanville & Demertzis, 1998).

1.3.4. Anxiety, trauma and facial expression interpretation

1.3.4.1. Crime and violence and facial expression interpretation

Correctly interpreting emotional expressions is central to understanding the feelings and behavioral intentions of other people (Aronoff, 2006; Silvia, Allan, Beauchamp, Maschauer, Workman, 2006). So if a person is unable to understand someone else's feelings and intentions, he or she may misinterpret an ambiguous facial expression (Hall, 2006). This may also lead a person who perceives the face to act or behave in a certain way. With a high level of exposure to violence and crime in South Africa, people are wary of others around them. Their sense of security and trust in the world and to people changes after experiencing or witnessing violence (Gibson et al., 2007). So without this trust, it is highly likely that they may be quick to misinterpret faces of the people around them.

In a study conducted by Kirsh, Mounts and Olczak (2006), results indicated that participants high in violent media exposure responded slower to happy faces and faster to depictions of anger than participants low in violent media consumption. This suggests that people who have had more exposure to violence may be biased towards angry faces. This may have survival connotations as recognizing hostile intent quickly can rapidly prepare one for "fight or flight" mode.

Physical abuse history has also been demonstrated to have an effect upon accuracy of interpretation of facial expressions. In a study conducted by Sullivan, Laurie Ann, Kirkpatrick, Sue, MacDonald and Pamelyn (1995), 29 sexually abused and 29 non-sexually abused females chose schematic faces which best represented different emotional scenarios. Results suggested that these girls seemed to focus upon selected emotions when interpreting facial expressions and

a lowered accuracy at identifying visual depictions of the six universal facial expressions of happiness, sadness, anger, fear, disgust and surprise than was a group of non-abused girls matching characteristics of ethnicity, gender, age and socioeconomic status.

Cameras, Grow and Ribordy (1983) postulated that misinterpretation of emotion could be explained via a transactional model of abuse. According to the model, abused people's deficits and misinterpretations of facial expressions and consequent social inadequacies result from the poor quality of the expressive environment surrounding the person. Another theory proposed by Hartman and Burgess (1989) suggests that sexually abused people may experience dissociation, have a psychological block or may ignore information that may be perceived as threatening, such as information from emotional expressions. The authors also mention that those who are sexually abused may block out information from a particular facial component as discussed in FACS, thus not being accurate at interpreting facial expressions. It is also suggested that with sexually abused children, they are often abused by "non angry", "loving" perpetrators who convince the children that the abuse is an act of love and hence this may affect the ways in which children interpret the facial expressions and intentions of others.

Another study examined emotional responses among women with and without Post Traumatic Stress Disorder (PTSD). The sample was primarily Caucasian (61.4%) and African American (30%) with a mean age of 25.43 years. Over two thirds of participants (68.6%) had at least some university education. There were no group differences in age, ethnicity or level of education. Results found that women with PTSD may experience and verbally express higher levels of

negative emotion in reaction to a variety of emotionally evocative stimuli versus women without PTSD (Orsillo, Batten, Plumb, Luterek & Roessner, 2004).

In terms of anger and the misinterpretation of faces, Fox, Russo, Bowles and Dutton (2001) found that anxiety was associated with an attentional bias for angry faces. In another study conducted by Hall (2006), the author attempted to assess the relationship between self-reported aggression and "seeing" anger in others. Results concluded that individuals reporting higher levels of overall aggression misidentified anger from the facial expressions when this was not the emotion presented. People lower in self reported aggressive attitude made significantly fewer errors in perceiving aggression where it did not exist. So the importance of these studies is that the anger that a person is feeling may be related to "seeing" anger in other people's faces. Added to this, hostility and aggression in South Africa are real artifacts of the high crime rate that exists in the country and research looking at traumatic events, anxiety and the interpretation of facial expressions may give information as to how we perceive each other in South Africa.

Since the effects of crime and violence appear to manifest in terms of aggression and anxiety in people, it is necessary to focus on how they affect non verbal communication between people. This may be explained by the way in which anxious people selectively attend to stimuli and how they then interpret other people's intentions. Thus if a person has experienced a traumatic event and has developed anxiety regarding the experience, he or she may feel apprehensive about what is to come in the future. Thus it is understandable that a person with "anxious apprehension" (Barlow, 2004) may start to interpret stimuli in a certain negative way. This increased attention

to negative stimuli as opposed to neutral stimuli is referred to as negative attentional bias and makes an anxious person feel more threatened (Derryberry & Reed, 2002).

1.3.4.2. Attentional bias

An important theme in researching emotional states is the distinction between normal and biased orienting of attention towards emotional information. Given the importance of emotional information in guiding our actions, researchers have claimed that emotionally-laden stimuli demand attention in everyone. This argument is particularly relevant for threatening information which requires fast attentional orienting, or selective attention, to the source of danger in order to maximize the chances of successful responding (Koster, Leyman, De Raedt & Crombez, 2006). It has been demonstrated time and time again that anxious individuals in clinical and non clinical groups have an attentional bias in favor of threat related information (Derryberry & Reed, 2002).

The concept of attentional bias was supported by a study conducted by Bradley and Lang (1999). Participants were required to make speeded judgments in response to the display of pleasant and unpleasant images. In other words, upon seeing an image of a rose versus an image of a growling dog, participants had to decide quickly whether the image was pleasant or unpleasant. The researchers found that anxious participants were quicker at identifying the unpleasant images compared with non anxious participants and there was no difference in their ability to identify the pleasant images.

Contrary to Bradley and Lang's results, Mathews and Milroy (1994) found no evidence of attentional bias. The authors used a similar method and presented negative versus positive words

to respondents, as opposed to pleasant or unpleasant images. Positive words such as "healthy" and "clever" versus negative words like "stupid" and "funeral" were used and participants had to decide quickly whether or not the word was positive or negative. As a result, the researchers found no evidence that anxious participants were any better at making speeded judgments concerning these opposing words when compared with non anxious participants.

1.3.4.3. Anxiety, attentional bias and interpreting facial expressions

Previous theories, such as Beck's (1976) "schema" and Bower's (1981) "network" theory, suggest that, in anxiety and depression, cognitive biases function throughout information processing as well as perception, attention and memory. Both theories propose that anxious individuals have a selective bias towards threatening information, whereas people suffering from depression are selective in paying attention to sadness, failure and loss (MacLeod & Rutherford, 1992).

Authors such as Eysenyk (1992) have supported Beck (1976) and Bower (1981) in saying that the primary cognitive factor underlying vulnerability to and maintenance of anxiety is the bias in selective attention to threat. Mathews (1990) has extended this research and states that an anxious person's cognitive system is changed into a hypervigilant mode that prioritizes the initial automatic encoding of threat. It is believed that this bias functions at a very early stage of the attentional process, which is responsible for initial orienting to and quick detection of threat in the environment. Mathews' (1990) research is in line with Barlow's theory (2004) of anxious apprehension and Eysenck's hypervigilance theory (1992) which explain that vigilance for threat

may also maintain clinical anxiety as anxious people are more likely than non anxious individuals to pick up and recognize threat cues in their environments.

This effect of being attentive to negativity has been demonstrated by people suffering from many anxiety disorders such as arachnophobia, panic disorder, post traumatic stress disorder, obsessive compulsive disorder and social phobia (MacLeod, Rutherford, Campbell, Ebsworthy & Holker, 2002). A study carried out by Melfsen and Florin (2002) suggested that social anxiety may have an impact on how people interpret facial expressions. Pictures of faces with either neutral, positive (joyful) or negative (angry, disgusted, sad) facial expressions were presented. Socially anxious respondents frequently made errors in matching faces and emotions. They also attended more to negative stimuli and reported seeing expressions in faces when they were in actual fact neutral. In explaining these findings, the authors looked at Beck's cognitive behavior theory and stated that selective attention may play a role in anxiety.

Other studies examining social anxiety and the interpretation of facial expressions have contradicted the above results. Bradley, Mogg, Millar, Bonham-Carter, Fergusson, Jenkins and Parr (1997) found that neither subjects elevated in social anxiety nor subjects elevated in depression scores showed a bias towards negative faces. Yuen (1994) found that participants with high social anxiety who believed that they would be asked to give a presentation after finishing a task showed longer reaction times for detecting probes that followed negative faces as compared to neutral faces. The author concluded that socially anxious individuals may actually be avoiding negative faces, at least when subjected to social threat.

A large amount of research on attentional bias has come from studies based on the emotional Spatial Orienting Task, the Stroop Task and the Dot Probe Tasks (Spielberger & Diaz-Guerrero, 1976).

The Spatial Orienting Task is used to study attention and anxiety. Participants are engaged in a motivated game where they may lose or gain points depending on their speed in detecting small, circular targets. Before each target appears, a peripheral cue is shown that orients attention to a positive location (e.g., where points can be won if the participant's response is quick enough) or negative location (where points can be lost if the participant's response is too delayed). As a result, trait anxious participants show an attentional bias favoring threatening locations where points may be lost. Its strength as an assessment tool is that it uses peripheral cues which are threatening and relevant to the participant in order to "distract' him or her. This means that context or meaning of the negative stimuli play an important part in distractibility or attention of anxious people (Derryberry & Reed, 2002).

The importance of context is supported by Mathews and Klug (1993). The authors used a mixed group of participants with clinical anxiety disorders and found that personal relevance, rather than emotionality, was associated with attentional bias responses. In a non-clinical sample, Riemann and McNally (1995) also found that attention was focused towards relevant current concerns versus stimuli that were positive or negative in emotional relevance.

In the Stroop Task, respondents are asked to rapidly name the colors of words displayed in different ink colors while ignoring the content of the word. The content of some of the words are

neutral words while others are threatening words. Since the content of the word is threatening, it has been found that anxious people are distracted and therefore have a delayed response in naming the color (Derryberry & Reed, 2002).

In the Dot Probe Task (MacLeod, Mathews & Tata, 1986), a threatening word and a neutral word are simultaneously presented on a screen. These stimuli are quickly followed by a target dot in one of the word's locations. It has been reported that anxious individuals are relatively fast to detect the target dot when it appears in the threatening word's location. This is because it is presumed that anxious people merely expect threatening information, thus draw their attention to negativity and see it. MacLeod and Rutherford (1992) also predict that elevated levels of any particular emotion, such as state anxiety, will be associated with a processing bias favoring the encoding of emotionally congruent stimuli.

The Dot Probe Task has also been adapted to studies investigating facial expression recognition accuracy. In such research, the Dot Probe Task presented pairs of stimuli. Thus an angry face and a neutral face would be displayed to the respondent and he or she would see the image for a brief period of time. The allocation of attention between the stimuli would be determined by response times to either identify or localize the probe. Using this task, Bradley, Mogg, Falla and Hamilton (1998) found that individuals with high levels of anxiety demonstrated attentional biases towards the location of angry faces. Fox (2002) has found the same result with fearful facial expressions. Furthermore Richards, French, Calder, Webb, Fox and Young (2002) presented ambiguous, emotional facial expressions that had been designed by placing two different facial expressions (such as happiness and fear) together. When these ambiguous

expressions were shown to respondents, those who were highly anxious were more likely than low anxious participants to identify them as fearful (Cooper, Rowe & Penton-Voak, 2007).

Studies researching attentional distraction and the interpretation of facial expressions using the Spatial Orienting Task, the Stroop Task and Dot Probe have ended up with contradictory results. Many studies propose that a strong relationship exists between anxiety vulnerability and negative attentional bias (Derryberry & Reed, 2002; MacLeod, et al., 2002) and others suggest that there is no relationship at all (Mathews & Milroy, 1994). Given the equivocal nature of the findings regarding attentional bias, the current study aims to use a large sample size in exploring this further.

1.3.4.4. Trait anxiety and facial expression recognition

It has also been suggested that trait anxiety may have an impact on how people interpret facial expressions. Surcinelli et al. (2006) and MacLeod et al. (2002) have found consistent results and state that attentional bias has been observed in non clinical samples with elevated trait anxiety scores.

In their study, Surcinelli et al. (2006) investigated the relationship between recognition of emotional facial expressions and trait anxiety. Students' anxiety levels were tested using the State Trait Anxiety Inventory developed by Speilberger, Gorsuch, Lushene, Vagg and Jacobs (1983) and each student had to complete a facial recognition task. An initial sample of 82 students aged between 18 and 33 years from the University of Bologna was selected. However, only students with scores over the 75th and under the 25th percentile were selected. This resulted

in a non clinical sample of 19 participants (nine males and ten females) with high trait anxiety which was compared with a sample of 20 participants (ten males and ten females) with low trait anxiety. The facial recognition task was 42 faces that were selected from Ekman and Friesen's (1976) Pictures of Facial Affect. Seven emotional expressions were portrayed namely: anger, disgust, sadness, surprise, fear, happiness and neutral. Male and female faces from different race groups were included for each expression.

Participants were invited to the laboratory of the Psychology Department of Bologna University where the experimental session was completed individually. Participants with high and low trait anxiety were then asked to sit one meter from a monitor where the pictures of faces would be presented. Each face was presented on the screen for ten seconds and after presentation of each face, participants were asked to select one of the seven expressions (anger, disgust, sadness, surprise, fear, happiness and neutral) that best described each emotional expression.

In statistical analyses, the number of correct responses for each participant for each type of facial expression was calculated and used as index of recognition accuracy. A Group (low anxiety versus high anxiety) by type of emotion repeated measures Analysis of Variance (ANOVA) was carried out. Greenhouse-Geisser adjustment to the degree of freedom was then performed, when suitable, and adjusted *P* values were reported. Lastly, Tukey's post ad hoc test was used in clarifying significant main effects and interaction.

Results indicated that surprise and happiness were the most recognized emotions while neutral expressions were better recognized than anger, fear and disgust. Furthermore, negative emotions

(anger, sadness, fear and disgust) were less recognized than other emotions (happiness, surprise and neutral) and sadness, fear and disgust were more recognized than anger. Lastly, Tukey post hoc tests revealed a statistically significant difference between the low trait anxiety group and the high trait anxiety group in the recognition of fear. The group with high levels of trait anxiety showed a better recognition of facial expressions depicting fear than the group with low trait anxiety while there were no differences in the recognition of other emotions.

In conclusion, Surcinelli et al. (2006) suggested that recognition bias in high anxiety participants is not generalized to negative emotions but is specific to fear. The authors added that the enhanced sensitivity for fearful expressions displayed by high trait anxious participants was not due to a simple response bias effect. They proposed that individuals with high levels of anxiety many perceive many daily situations as threatening and the authors stated that this may result in more frequent experiences of fear of what may happen.

According to Suricinelli et al. (2006), fear faces are not threatening as they appear but may be interpreted by individuals with high anxiety as a sign of threat and danger in the environment, a signal that the person who is looking fearful is in a threatening situation. According to a functional view of emotions (Maner et al., 2005), a primary function of anxiety is to detect and deal with threat. Lastly the authors propose that high anxious individuals who may be more likely to classify ambiguous faces as expressing fear may attempt to avoid interpersonal relationships and may be predisposed in adopting avoidant styles in social relationships.

Another feasible explanation for high trait anxious people performing well on the recognition of fearful faces may be in a cognitive process called confirmation bias. This bias is a tendency to search for or interpret new information in a way that confirms or reinforces one's preconceptions. It refers to a type of selective thinking whereby one may also avoid information that contradicts prior beliefs. Gilovich (1993) states that we may develop confirmation bias because it is cognitively easier to deal with the situation. It may also be cognitively easier for anxious people who are attentive to negative stimuli to confirm this negativity in social situations (Hall, 2006). More specifically, anxious people may believe that the world is a threatening place. They may then search for or interpret new information, such as some one else's facial expression, in a way that confirms their anxiety. Seeing someone else with a fearful expression may be the result of this. In other words, this tendency to confirm preconceptions may lead to people attributing what they want to see in people's faces and people may then make mistakes in interpreting facial expressions of others.

Fox (2002) has found similar findings to Suricinelli et al. (2006) when working with photographs of fearful, relative to neutral, facial expressions. However research has questioned whether it is specifically the threatening material that attracts anxious people towards negativity. Martin, Williams and Clark (1991) found that anxious individuals show a bias in favor of the emotionality hypothesis. In other words, evidence suggested that anxiety is associated with a bias towards emotional material in general rather than threat material in particular.

Contrary to the study conducted by Suricinelli et al. (2006), Cooper et al. (in press, 2007) carried out very similar research and found that there were no anxiety-related differences in emotion

perception across seven specific emotions. Cooper et al. (in press, 2007) administered the same version of the STAI (Speilberger, et al., 1983) as did Surcinelli and his colleagues (2006) to 109 undergraduate students. The inventories were scored and only students with scores over the 75th and under the 25th percentile were selected. This resulted in a sample of 27 participants with high trait anxiety which was compared with a sample of 27 participants with low trait anxiety. Added to this Cooper and his colleagues (in press, 2007) used the same facial recognition task where 70 images were selected from Ekman and Friesen's (1976) Pictures of Facial Affect. Participants were asked to sit in front of computers and to view 70 male and female faces from different racial backgrounds, each with expressions of anger, disgust, sadness, surprise, fear, happiness or neutral. Participants had to accurately label each expression. One difference that Cooper et al. (in press, 2007) made in their method as compared to Surcinelli et al. (2006) was that participants had a maximum of four seconds, as opposed to ten seconds, to label each expression.

With regards to results, Cooper and his colleagues (in press, 2007) found that happiness was recognized more accurately than all other emotional expressions with the exception of surprise. In the same vein, surprise was recognized more accurately than all other expressions with the exception of neutral faces and faces displaying happiness. Lastly, recognition accuracy for anger, disgust, fear and sadness did not differ significantly. These results were in contrast with those of Surcinelli et al. (2006) who concluded that high trait anxious students were more accurate at recognizing fearful facial expressions compared with students who rated low in trait anxiety.

A possible explanation for the discrepancy in results of the two studies is that there is a difference in anxiety scores across the two samples. Participants in the Surcinelli et al. (2006)

study were more anxious than the participants in the Cooper et al. (in press, 2007) study. The mean scores for high trait anxiety were 57.1 versus 53.1 and 29.3 versus 31.2 for low trait anxiety, respectively. Given that Surcinelli et al. (2006) suggest that higher levels of trait anxiety are related with a better ability to recognize fearful facial expressions accurately; it could be possible than an increased level of trait anxiety in the Surcinelli et al. (2006) study may account for the discrepant results.

Another possible reason for the discrepancy in results is the different duration for which participants were exposed to stimuli. In the Surcinelli et al. (2006) study, images of faces were presented for ten seconds and thus there was little time pressure for participants to respond. However in the Cooper et al. (in press, 2007) study participants were instructed to identify facial expressions as quickly as possible and this resulted in the average of 2059 ms across expressions. Since participants in the Surcinelli et al. (2006) study recognized fearful faces more accurately than in the Cooper et al. (in press, 2007) study, it is suggested that the high trait anxious group spent a longer time attending to fearful faces. In turn, this increased attention may account for better performance on recognition of fearful faces in the Surcinelli et al. (2006) study.

In support of Cooper et al. (2007) study, Koster, Leyman, De Raedt and Crombez (2006) also conducted a study investigating anxious students' attentive processing of emotional facial expressions. One hundred and forty nine undergraduate psychology students at the Ghent University in Belgium were asked to participate in the study. Participants were asked to complete the Depression Anxiety and Stress Scale where a self report scale for anxiety would determine levels of trait anxiety within the sample group. Faces depicting emotional expressions (neutral,

happy, sad and angry) were taken from the Karolinska Directed Emotional Faces database and presented to students. Lastly the Exogenous Cueing Task was used to display facial expressions and to monitor attentional bias. Participants had to respond as quickly and accurately as possible to what they thought each facial expression was showing.

The researchers predicted that high anxiety would be related to enhanced engagement with and a difficulty to disengage from angry facial expressions. Results indicated that there were no attentional cueing effects by emotional facial expressions in the overall sample. Secondly that attentional cueing by emotional faces was not correlated with anxiety, depression or stress scores and lastly that attentional cueing by emotional faces did not differ between individuals with extreme scores (high versus low) on the anxiety, depression or stress scale (Koster et al., 2006).

1.3.4.5. Trait anxiety and neurophysiology of expression recognition

Rossignol, Philippot, Douilliez, Crommelinck and Campanella (2005) stated that anxiety is meant to interfere with cognitive and emotional processing. They used the STAI (Speilberger, et al., 1983) and images selected from the Pictures of Facial Affect series (1976) to investigate the neurophysiological correlates of emotional processing of fear and happiness in sub-clinical anxiety. One hundred and twenty eight (n=128) students from the University of Louvain were selected. The distinction between high (n=10) and low (n=10) anxiety groups was made by median splits on standardized measure of trait anxiety. Facial expressions were displayed and participants had to point out as quickly as possible the occurrence of a deviant stimulus. EEG recordings were noted and eye movement responses were recorded.

The authors found that high anxious participants were faster than non anxious participants to detect deviant faces as suggested by quick reaction times. Added to this, high trait anxious participants showed a reduced ability to process the emotional content of faces. Rossignol et al. (2005) state that their findings are likely to be based on the idea that most emotions, such as fear, are processed in an automatic and unconscious way, and that this processing is mainly sustained by the activation of the amygdala.

1.3.5. The present study

From the above literature, it is reasonable to predict that the data from the present study will find that people with higher levels of trauma have higher levels of anxiety.

There may also be a possibility that those students who have higher levels of anxiety will have an attentional bias towards negative facial expressions. If this is the result, then the present study's findings will be similar to the conclusion made by Surcinelli et al. (2006) who suggested that recognition bias in high anxiety participants is generalized to negative emotions. However the present study may not support the theory of attentional bias. Thus results may be similar to Cooper and his colleagues' (in press, 2007) findings who found that happiness was recognized more accurately than all other emotional expressions and that recognition accuracy for a variety of facial expressions did not differ significantly.

1.4. Aims

The present study is therefore to investigate whether or not experiencing a traumatic event or events is related to an individual's ability to interpret another person's facial expressions. Additionally, the study explores whether anxiety acts as a mediator for any such effects.

2. Research Method

2.1 Participants

A total of 652 First Year Psychology students at the University of the Witwatersrand (WITS), South Africa were invited to participate in the research. All completed the tasks. However, 20 incomplete questionnaires were excluded from the study group. The final study group comprised 632 respondents (n=632). The final sample consisted of 70% female participants as opposed to 30% who were male. Additionally, the majority of the sample were 18-19 year olds (67%), with only 3.8% forming the older than 25 years group.

Table 1: Demographics of participants in study

Category	Number of units per category	Percentage of sample
Gender of participants (/632)	Male: 190	30.1
	Female: 442	69.9
Ages of participants (/632)	18-19 years old: 425	67.2
	20-22 years old: 165	26.1
	23-25 years old: 17	2.7
	Older than 25 years: 24	3.8
Home language (/632)	English: 359	57
	Zulu: 71	11.2
	Sotho: 36	5.7
	Tswana: 34	5.4
	Xhosa: 29	4.6
	Afrikaans: 12	1.9
	Other: 91	14.4

2.2 Measuring instruments

2.2.1. Traumatic Stress Schedule (TSS)

The TSS by Norris (1990) is a short screening instrument for assessing traumatic stress in the general population and was used to collect information regarding traumatic events experienced by the sample group. Please see Appendix 3: The Traumatic Stress Schedule. According to Norris (1992) the measure has good reliability and validity. An acceptable total alpha value (0.75) has been reported as a measure of the TSS's internal consistency (Norris, 1992).

The TSS consists of nine questions where the participant is required to answer "yes" or "no" and to indicate if the trauma happened 0-3 months ago; 3-6 months ago; 6-12 months ago; 12-18 months ago; 18-24 months ago and/or more than 24 months ago. These traumatic events are categorized as follows: 1) robbery; 2) physical assault; 3) sexual assault, forced unwanted sexual activity of any kind; 4) death of a loved one through accident, homicide or suicide; 5) experienced hijacking; 6) motor vehicle accident; 7) serving in combat; 8) injury and damage due to fire and 9) injury from natural or manmade disaster. The TSS takes approximately five minutes to complete.

In South Africa, the TSS has been used as an assessment tool and is currently being adapted for the South African population in Pretoria by Hoffman (2002). This tool is appropriate for this study as it was used as a screening tool to identify the types of trauma and the times since the traumas occurred. This helped in minimizing the risks of the study as participants only had to name the traumatic event(s) which they had experienced and so this may have reduced the

possibility of them re experiencing the traumatic feelings associated with the event(s). The TSS is also short and appropriate for large group administration (Norris, 1990).

2.2.2. The State Trait Anxiety Inventory (STAI)

The STAI was devised in 1964 by Speilberger and Gorsuch. It was then revised in 1979 and by 1985 the STAI Form Y (Speilberger, Gorsuch, Lushene, Vagg & Jacobs, 1983) was published. The STAI Y form is a brief, self-rating scale for the assessment of state and trait anxiety. It was used as an instrument for measuring respondents' anxiety levels. It clearly differentiates between the temporary condition of "state anxiety" that is characterized by tension, nervousness and worry; and the person's fundamental "trait anxiety" that is characterized by the relatively stable individual differences in anxiety proneness as a personality trait. Please see Appendix 4: The State Trait Anxiety Inventory. It has been used extensively in research and clinical practice and is reported to be reliable and valid (Speilberger et al., 1983). One study found excellent test-retest reliability with Pearson coefficient being between 0.75 and 0.98 for individual items and equal to 0.96 for state and 0.98 for trait anxiety (Fountoulakis, Papadopoulou, Kleanthous, Popadopoulou, Bizeli, Nimatoudis, Iacovides & Kaprinis, 2006).

The STAI Y has 40 statements with a range of four possible responses to each question. For example the participant may read "I feel pleasant" and may respond by coloring in a circle indicating: "almost never"; "sometimes"; often" and/or "almost always." The STAI Y takes approximately ten minutes to complete and reverse scoring is used in attaining individual results.

The STAI Y Form has been used in assessments in South Africa (Mimi, Roberts, Robin, Emsley, Willem, Pienaar, Dan & Stein, 1995; Rieckert & Möller, 2000). In the present study, the state form was used to control for anxiety about the research testing situation whereas the trait anxiety measure was used in core analyses to look at a more pervasive tendency to be anxious.

2.2.3. DANVA

The Diagnostic Analysis of Nonverbal Accuracy 2, Adult Facial Expressions (DANVA-2-AF) is a test that measures an individual's non-verbal processing ability as well as a participant's ability to identify varying intensities of emotions (Nowiki & Duke, 1994). It was used in this research to understand how participants interpreted the facial expressions of others. Please refer to Appendix 5: The Diagnostic Analysis of Nonverbal Accuracy 2 Test to see the DANVA-2-AF answer sheet and Appendix 6: The Diagnostic Analysis of Nonverbal Accuracy 2 presentation. In the development of the DANVA-2-AF, an initial sample of 1141 individuals ranging between the ages of four to 55 was used. Results indicated internal consistency and reliability over time (Hall, et al., 1999). The internal consistency coefficient for facial expression was 0.88 while test-retest reliability was reported at 0.86. Construct validity has also been supported in research (Nowicki & Duke, 1994). Hall, Gaul and Kent (1999) add that the DANVA is likely to be independent of intelligence. The instrument has subtests consisting of Facial Expression Tests, Paralanguage Tests and Posture Tests. For the purposes of this study, only the facial expression test for adults was used. The DANVA-2-AF takes approximately ten minutes to complete.

2.3. Procedure

The researcher received permission from lecturers to gather her data during two First Year Psychology lectures which took place in Senate House at WITS. Each class was 45 minutes long with approximately 350 students attending each session. This approach was used as it ensured that participants felt comfortable in familiar surroundings and guaranteed that the researcher could invite as many First Year Psychology students to participate in her study as possible.

The researcher arrived at the lecture hall prior to the assessment to set up a laptop and projection screen. As the students arrived she handed out stapled assessment packs. Each pack included an invitation letter explaining her research (Appendix 1: Letter of invitation to participants) a short biographical questionnaire (Appendix 2: The biographical questionnaire), a TSS (Appendix 3: The Traumatic Stress Schedule), a STAI (Appendix 4: The State Trait Anxiety Inventory), and a DANVA-2-AF answer sheet for the facial expressions subtest (Appendix 5: The Diagnostic Analysis of Nonverbal Accuracy 2 Test).

The researcher introduced herself. She then told the students that she was there to do a study on the factors that influenced the interpretation of facial expressions. She added that the research was in partial fulfillment for her Masters in Community Counseling Psychology degree. Then she invited the students to participate in her study. She explained the voluntary, anonymous and confidential nature of participation and informed them that the assessment would take approximately thirty minutes to complete. She also said that there would be no negative consequences if students decided not to participate. Students were then given a few minutes to read the invitation letter. The researcher then spoke about the most salient points in the letter and

asked the students if they had any questions. Students then had the chance to leave the lecture hall if they were not prepared to participate in the study. The researcher thanked the willing participants and stated that if a student accepted what was written in the letter and decided to continue, she would assume that the participant had given their consent to participate in the study. Respondents were also informed of their rights to discontinue with the assessment once they had started and were assured that there would be no negative consequences in doing so. As it turned out, no participants discontinued the tasks.

In administering the assessment, the researcher alerted participants to the fact that answers given to biographical questions would not lead to their identification. Students were then given a few minutes to complete the short biographical questionnaire.

Once participants had finished, the researcher explained the first task. Students were required to read questions of the TSS that related to traumatic events that they, or someone very close to them, had experienced. The researcher gave an explanation regarding the multiple choice type answering technique that was required and participants were given five to ten minutes to finish answering questions.

Thereafter, students were asked to complete the STAI and the researcher emphasized the importance of answering all the questions. Again she explained the multiple choices in responding to the STAI statements and participants were given ten minutes to complete the task.

The researcher then gave a short explanation of psychometric tests. She stated that these tools were developed and then experimentally validated so that they were accurate in measuring what they were meant to be measuring. She added that some of these scientific tests were developed years ago and that the DANVA-2-AF was one of the older assessment tools. She explained that photographs of 24 men and women's faces were going to be projected on a screen in front of the lecture hall and that the styles and fashions of these people were going to look out dated and a little funny. However the researcher emphasized that a facial expression in the old days still looked like the same facial expression in modern times. She then explained that participants would have to look at each face on the screen for five seconds and would have to choose if that face looked happy, sad, angry or fearful with either a high or low level of intensity. Students were required to record each response on a sheet provided to them.

At the end of each 45 minute session, respondents were asked to place their stapled answer packs face down on the desk in the front of the lecture hall. This ensured anonymity.

After data were captured, 16 participants were disregarded as they had not answered all the questions of the State-Trait Anxiety Inventory (STAI). Another four were excluded for not specifying a trauma or for indicating a type of trauma after stating they had not experienced a trauma. As a result, a sample of 632 participants was used.

2.4. Research design

A quantitative design was selected as most appropriate to answer the research questions. A quantitative design also allowed the researcher to explore the aims of the study and assisted in

the assimilation of information from many different sources. The following descriptive statistical methods were used:

- Correlation matrix to identify important relationships between trauma, anxiety and facial expressions.
- Comparison of averages to identify differences in the interpretation of the facial expressions for people with different levels of anxiety and trauma.
- Analysis of Variance (ANOVA) to determine whether the differences identified were statistically significant.

2.5. Analysis of raw data

In terms of analyzing the raw data, the independent variables consisted of the TSS, STAI (state and trait anxiety) while the dependent variable was information from the DANVA-2-AF. The facial expressions scales from the DANVA-2-AF were scored for an overall result. Results from the STAI and the TSS were analyzed using a variety of descriptive statistical methods (e.g. comparison of averages, correlation matrix and ANOVA).

In relation to the aims of the study, the question: "Does trauma affect the way in which people interpret facial expressions?" was posed. In this part of the study, the TSS was considered. The researcher compared trauma versus non trauma experienced on facial affect (DANVA-2-AF) scores.

The last aim tested whether anxiety affected the way in which people interpreted facial expressions. The STAI and the DANVA-2-AF were used in this regard and both state and trait anxieties were separated into high versus low state and trait anxieties.

Furthermore, the sample was divided into a low state anxiety group and a low trait anxiety group where participants who scored below the 25th percentile on the STAI were chosen. Added to this, a high state anxiety group and a high trait anxiety group where participants who scored above the 75th percentile were selected. The distribution of low versus high anxious groups is presented in Table 2.

Table 2: Participants below the 25th percentiles and above the 75th percentiles on the STAI

Category	**Number of people (n=)**	**Percentage of sample**
State anxiety	Low state: 168	26.6
	High state: 163	25.8
Trait anxiety	Low trait: 172	27.2
	High trait: 172	27.2

2.6. Ethical considerations

Respondents were asked about traumatic events that they had experienced. The researcher aimed to minimize any potential risk by stating in the beginning of the session that respondents who had started the assessment did not have to complete the tests if they do not want to and that

participants would not be disadvantaged in any way if they were to discontinue with the assessment.

The researcher also contacted staff at the WITS Trauma Clinic; the Depression and Anxiety Group; the Centre for Career Development Unit and her supervisor, Ms. Esther Price, told them when the study would be taking place and that they might be approached by participants. She made certain that students would be able to go for therapy if they required it without paying for the service. She also chose these facilities as they were located close to the University. The details, including phone numbers and contact persons for the above centers, were written in the participant invitation letter. See Appendix 1.The researcher added that participants were welcome to approach her directly for assistance after the session.

In terms of confidentiality, no-one, other than the researcher, had access to research material. No students were asked for identifying information and using the last four digits of their student numbers also ensured confidentiality. After respondents completed the assessment, they placed their answer papers face down on the desk in the front of the lecture hall ensuring anonymity. Lastly, the tests were administered in the participants' usual lecture halls, chosen to ensure a familiar environment.

This research proposal was submitted to the Human Research Ethics Committee (School of Human & Community Development). The Committee awarded a clearance certificate. Please refer to Appendix 7 for ethical clearance certificate.

3. Results

3.1. Preliminary Analyses

Results indicated that there were very few participants who had not experienced any traumatic events as categorized by the Traumatic Stress Schedule (TSS). Seventy two (11.4%) students had not experienced any of the classes of traumatic events while 560 (88.6%) students reported experiencing various types of traumatic event/s. On average, each participant who stated that he or she had experienced a traumatic event experienced 2.22 different types of traumatic events. What follows is a discussion of the unbalanced number of students in each group (i.e. number of those who had experienced traumatic events versus those who had not) followed by a preliminary analysis of different traumas experienced by participants.

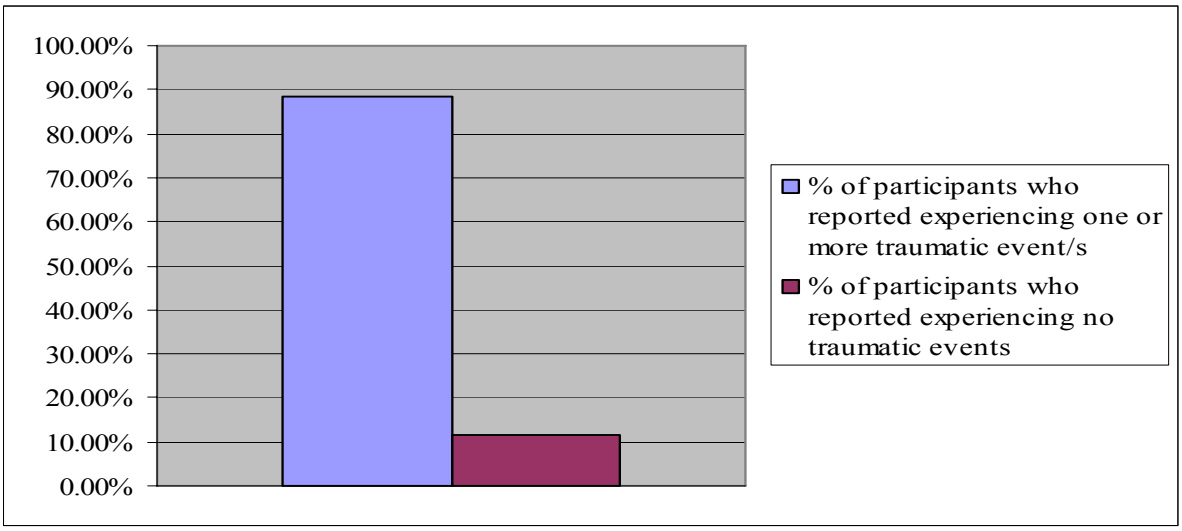


Figure 1: Percentages of participants reporting experienced traumatic events as per the TSS

Reflecting upon the small number of students who had not experienced traumatic events (11.4%) versus the large amount of students who had (88.6%), one could say that there are an unbalanced number of students in each group. Therefore this results in unbalanced data and an unbalanced design. One should keep in mind that classical work conducted by Ekman (1972) and Ekman, Sorensen & Friesen, (1969) and other pioneers in the field was demonstrating the universality of facial expressions rather than cultural differences between groups. Research centered on this goal and therefore their studies rarely, if ever, used balanced designs (Elfenbein & Ambady, 2002). The goal of the current study depends on the traumatic experiences that students have experienced and thus controlling a balanced number of subjects is difficult. The disadvantages of using an unbalanced design are as follows: calculations are much more complicated than when using a balanced design and equivalence among factor levels is lost (Howell, 1992). According to Howell (1992), with regards to difficult calculation using unbalanced design, all sums of squares do not add up the way they would in a design with equal sample sizes. He adds that the unequal sample sizes cause effects to be partially confounded with each other.

In terms of the preliminary analysis of different traumas experienced by participants, from the sample group of 632 participants, 301 (47.6%) people experienced trauma from the death of a very close friend or family member who may have died due to an accident, homicide or suicide. Two hundred and ninety five participants (46.7%) had been hijacked or experienced trauma of a very close friend being hijacked; 135 (21.4%) students were beaten up or physically attacked; 90 (14.2%) had experienced a motor vehicle accident that was serious enough to cause injury and 63 (10%) people suffered injury or property damage due to severe weather or either natural or manmade disaster. Furthermore 48 (7.6%) participants experienced trauma due to someone

forcing them to have sex or unwanted sexual activity with them and 24 (3.8%) people suffered injury or extensive property damage because of fire. Lastly, results indicated that 10 (1.6%) served in combat. Figure 2 graphically captures the number of people who reported experiencing specific traumatic events.

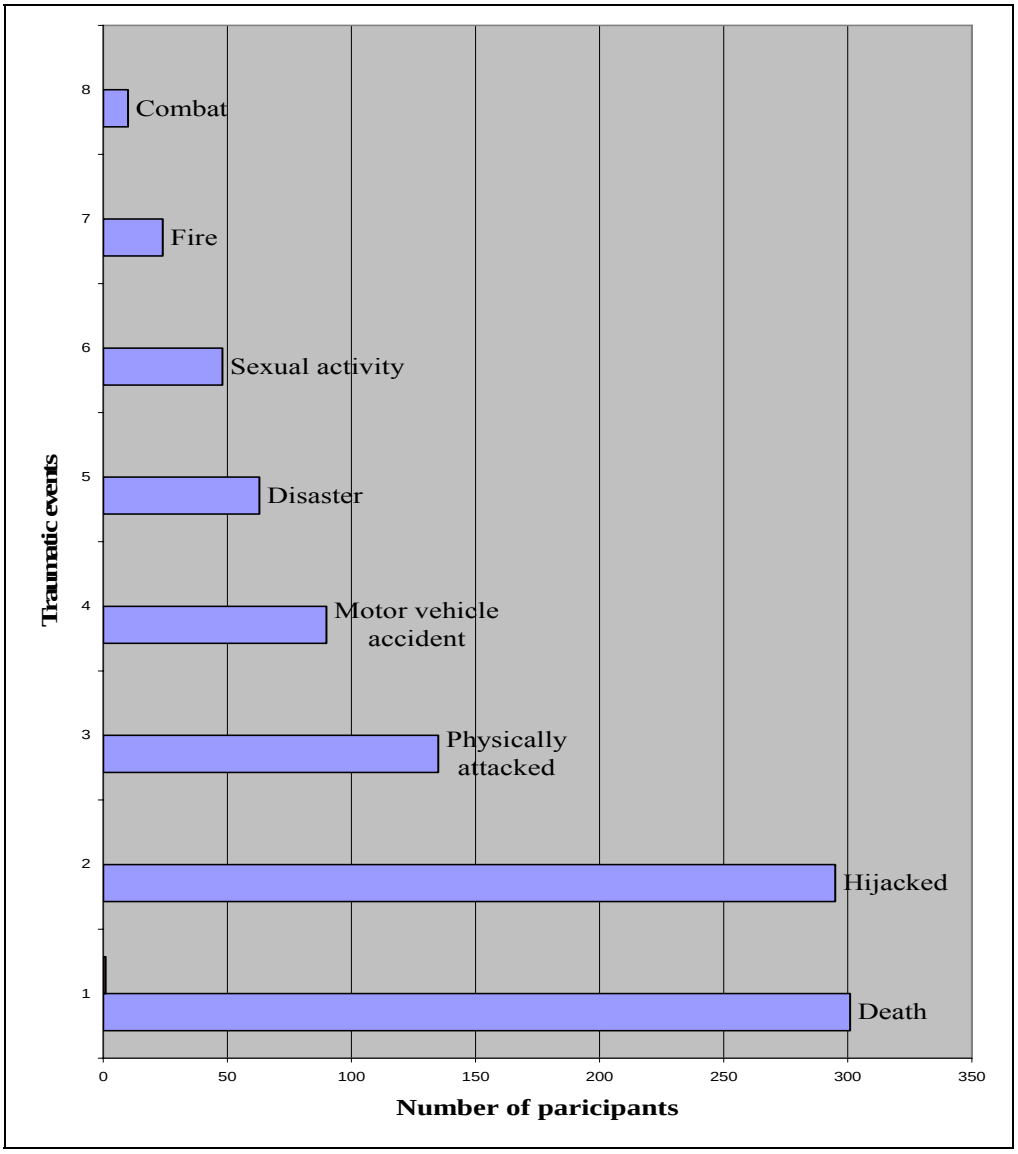


Figure 2: Number of participants reporting experienced traumatic events as per the TSS

3.2. Main Analyses

There were many variables within the matrix of the study design as conceived in the research protocol. These included whether or not participants had experienced traumatic experiences or not; the categorization of participants into groups of low versus high anxiety; and groups of state versus trait anxiety. Distinctions were also made as to whether participants had accurately identified facial expressions presented to them on the DANVA-2-AF. All these variables are represented in the data set of results obtained from the study and had to be ordered in a logical manner so that research questions and hypotheses could be explored. Therefore a comparison tree was drawn up to assist systematic analysis and is shown in Table 3: Comparison tree of structure of systematic analyses.

Table 3: Comparison tree of structure of systematic analyses

				Ave	N =
Total				**71%**	**631**
	Trauma			***71%***	***560***
		Trait		71%	560
			Hi	*70%*	*158*
				Happy	91%	*158*
				Fear	58%	*158*
				Anger	56%	*158*
				Sad	75%	*158*
			Med	*69%*	*260*
				Happy	89%	*260*
				Fear	57%	*260*
				Anger	59%	*260*
				Sad	73%	*260*
			Low	*73%*	*142*
				Happy	93%	*142*
				Fear	60%	*142*
				Anger	62%	*142*
				Sad	78%	*142*
		State		71%	560
			Hi	*70%*	*153*
				Happy	89%	*153*
				Fear	56%	*153*
				Anger	59%	*153*
				Sad	75%	*153*
			Med	*70%*	*265*
				Happy	90%	*265*
				Fear	58%	*265*
				Anger	59%	*265*
				Sad	73%	*265*
			Low	*73%*	*142*
				Happy	93%	*142*
				Fear	62%	*142*
				Anger	59%	*142*
				Sad	78%	*142*
	No Trauma			***71%***	***71***
		Trait		71%	71
			Hi	*72%*	*14*
				Happy	94%	*14*
				Fear	61%	*14*
				Anger	55%	*14*
				Sad	77%	*14*
			Med	*72%*	*27*
				Happy	91%	*27*
				Fear	59%	*27*
				Anger	65%	*27*
				Sad	75%	*27*
			Low	*68%*	*30*
				Happy	91%	*30*
				Fear	61%	*30*
				Anger	56%	*30*
				Sad	66%	*30*
		State		71%	71
			Hi	*64%*	*9*
				Happy	91%	*9*
				Fear	56%	*9*
				Anger	48%	*9*
				Sad	63%	*9*
			Med	*76%*	*35*
				Happy	95%	*35*
				Fear	60%	*35*
				Anger	66%	*35*
				Sad	80%	*35*
			Low	*66%*	*27*
				Happy	86%	*27*
				Fear	62%	*27*
				Anger	54%	*27*
				Sad	63%	*27*

To explain Table 3, for each branch of the tree (e.g. no trauma experienced by participant, high state anxiety and accurate interpretation of a happy facial expression) the average score of the accurate identification of that facial expression for those people in that category was calculated. This enabled comparisons of scores across the categories. An ANOVA was performed to identify whether differences were statistically significant.

The differences were analyzed at three levels:

1. Differences between those participants who had experienced traumatic events versus those who had not experienced traumatic events.
2. Differences between people with different levels of state and trait anxiety within and between the different levels of experienced trauma (e.g. high state anxious people who have and who have not experienced traumatic events).
3. Differences in the interpretation of specific facial expressions (i.e. happy, sad, anger, fear) for people with different levels of experienced trauma and anxiety.

These results were used to prove or to disprove the hypotheses described. In light of this, results which aim to explore the null hypothesis regarding trauma and anxiety are reported first. Then information which may assist in investigating alternative hypotheses 2 and 3 (H2 and H3) is shown using Figure 3 and Figure 4. Furthermore alternative hypothesis 4 (H4) may be explored using Figure 6; alternative hypothesis 5 (H5) may be investigated by using Figure 7; alternative hypothesis 6 (H6) may be proved or disproved using information gained by Figure 8 and alternative hypothesis 7 (H7) using Figure 9.

3.2.1. Relationship between trauma and anxiety

The current study attempted to explore the relationship between trauma and anxiety. A comparison of the average anxiety level for people who had experienced trauma and people who had not experienced trauma was done. An ANOVA was then done to determine whether the average anxiety levels were significantly different. Results indicated that there was a relationship between number of traumatic events experienced, and state and trait anxiety. Specifically, anxiety levels increased as a function of the number of traumas experienced. Analysis of variance (ANOVA) revealed that those participants who had experienced trauma were more likely to experience higher state anxiety ($F=7.7$ vs $Fcrit=3.85$ for $P<0.05$) versus those who had not. Furthermore, those who had experienced trauma were more likely to experience higher trait anxiety ($F=7.3$ vs $Fcrit=3.85$ for $P<0.05$) than those who had not.

Table 4: Results of ANOVA on relationship between state and trait anxiety and the incidence of trauma

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
State_ty	560	23045	41.2	127.7
State_tn	71	2645	37.3	96.1

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	957.5	1	957.5	7.7	0.00566	3.9
Within Groups	78127.5	629	124.2			
Total	79085.08082	630				

Anova: Single Factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Trait_ty	560	24625	43.97321429	102.1906945
Trait_tn	71	2879	40.54929577	93.25110664

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	738.7	1	738.7	7.3	0.00708	3.9
Within Groups	63652.2	629	101.2			
Total	64390.9	630				

Table 5: Correlation matrix showing the correlation between incidence of trauma and state and trait anxiety

	Trauma	*trait anxiety*	*state anxiety*
Trauma	100%		
trait anxiety	10%	100%	
state anxiety	12%	61%	100%

3.2.2 The distribution of DANVA answers for state and trait anxious groups

Figure 3: Distributions (in percentages) of responses in answering the DANVA for low and high state anxious participants respectively and Figure 4: Distributions (in percentages) of responses in answering the DANVA for low and high trait anxious participants respectively show participants' actual answers to the DANVA 2-AF. To explain these figures, the first graph in

Figure 3 is briefly discussed. It shows that when low state anxious participants looked at facial expressions in the DANVA-2-AF that were happy, 91% of participants agreed that the faces displayed happy facial expressions and the participants answered correctly. 2% of participants stated that the happy faces looked fearful; 1% stated that the faces had angry expressions and 6% stated that the happy facial expressions appeared to look sad.

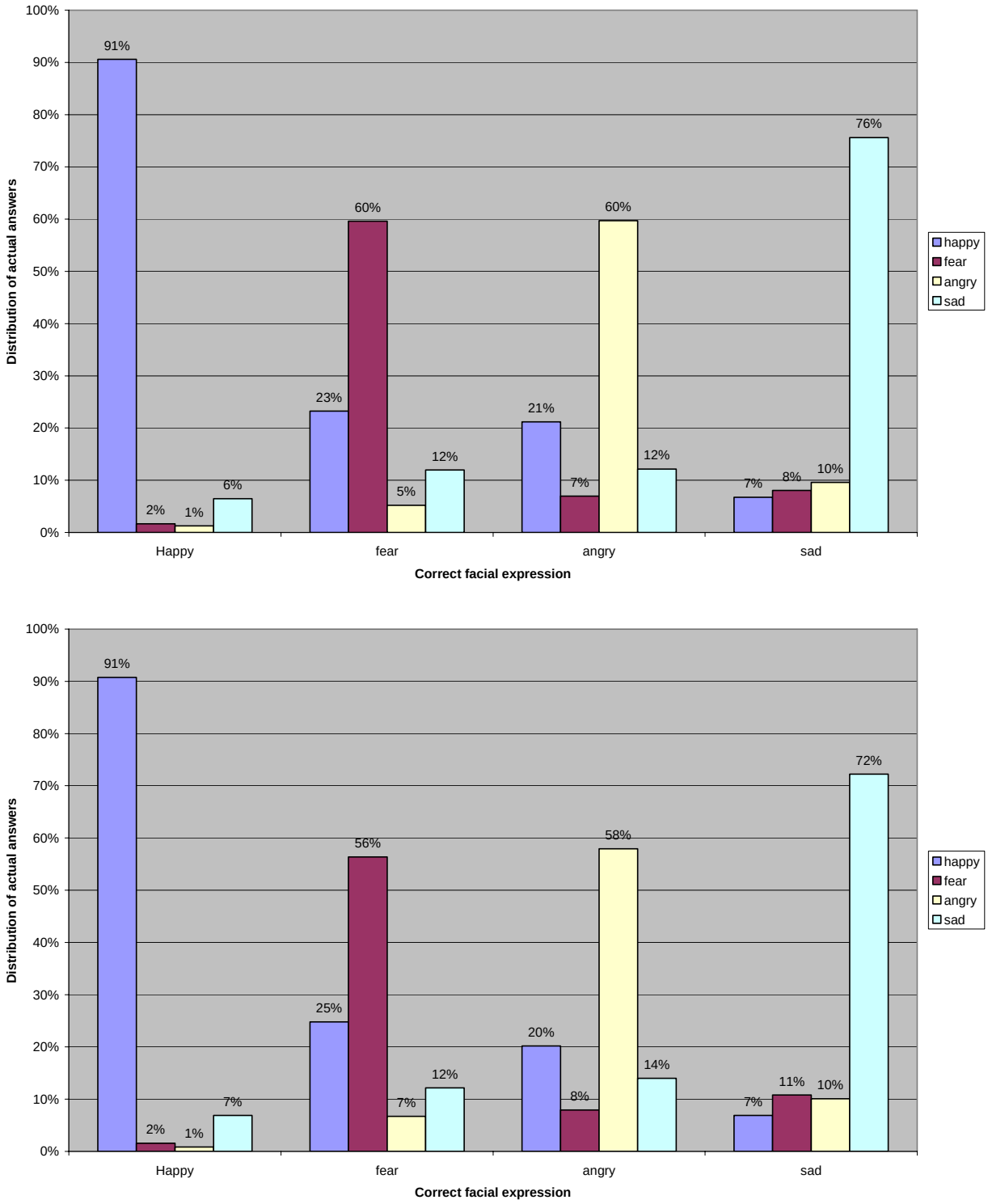


Figure 3: Distributions (in percentages) of responses in answering the DANVA for low and high state anxious participants respectively

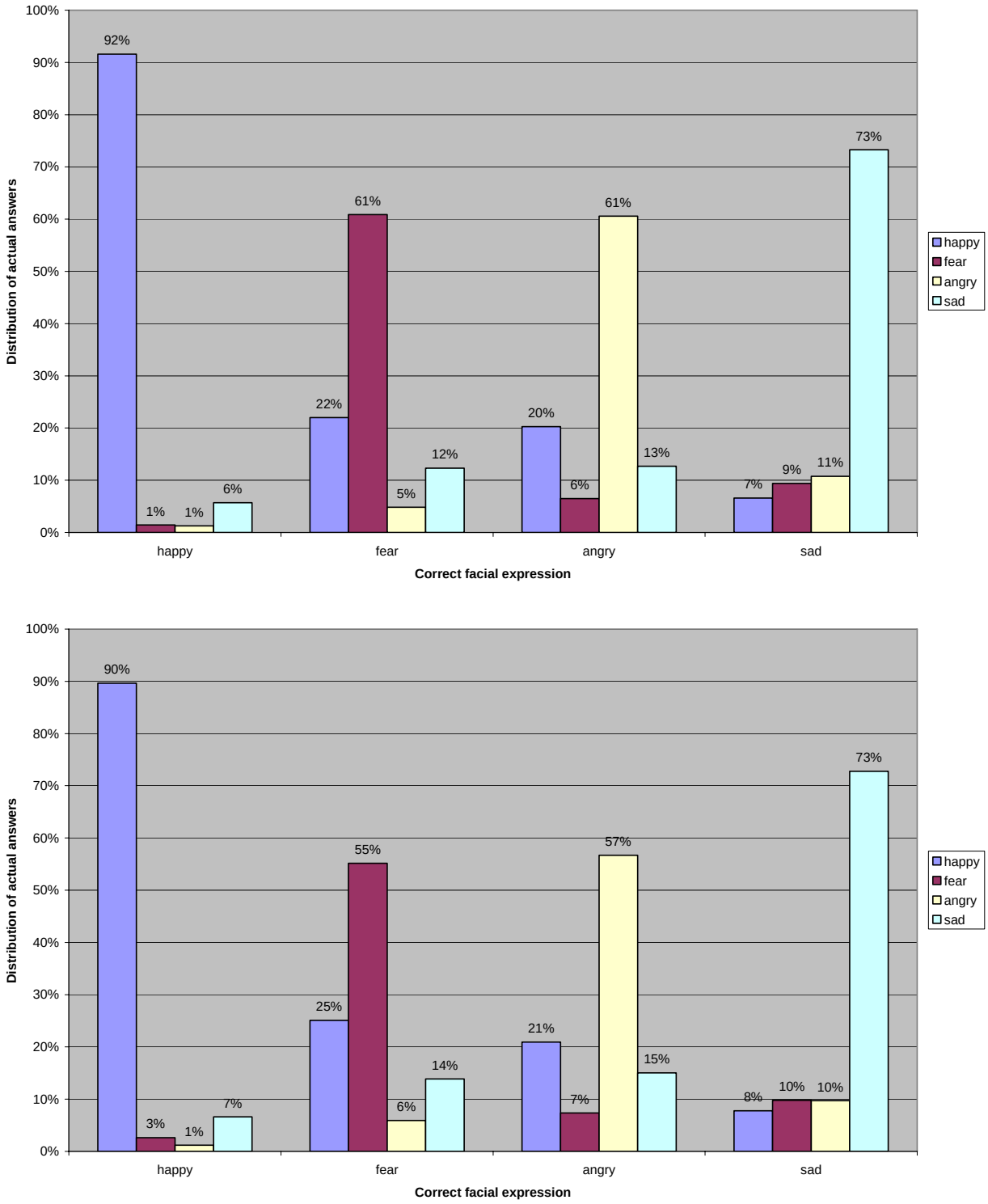


Figure 4: Distributions (in percentages) of responses in answering the DANVA for low and high trait anxious participants respectively

The most salient findings when analyzing the actual responses to questions posed on the DANVA-2-AF are discussed. The following results were found for both state and trait anxious groups of people:

- Accurate interpretation of faces is highest for happy faces.
- There is no statistically significant difference between high anxious people's responses and low anxious people's responses on the DANVA-2-AF for fearful, angry and sad facial expressions.
- Thus there is no evidence of over reporting of fearful, angry and sad facial expressions.

3.2.3. The relationship between trauma, anxiety and the accurate recognition of facial expressions

In an overall analysis of the data when the difference in accuracy of results for facial expressions between people who experienced traumatic events versus people who did not experience traumatic events was done, the following was found:

- The analysis, which compares the weighted averages of accurate responses for different facial expressions between people who experienced traumatic events versus those who did not experience traumatic events shows a non statistically significant relationship at a 95% confidence level.

Note: all averages in the graphs that are based on the following analyses are weighted averages based on the population of each sub-group.

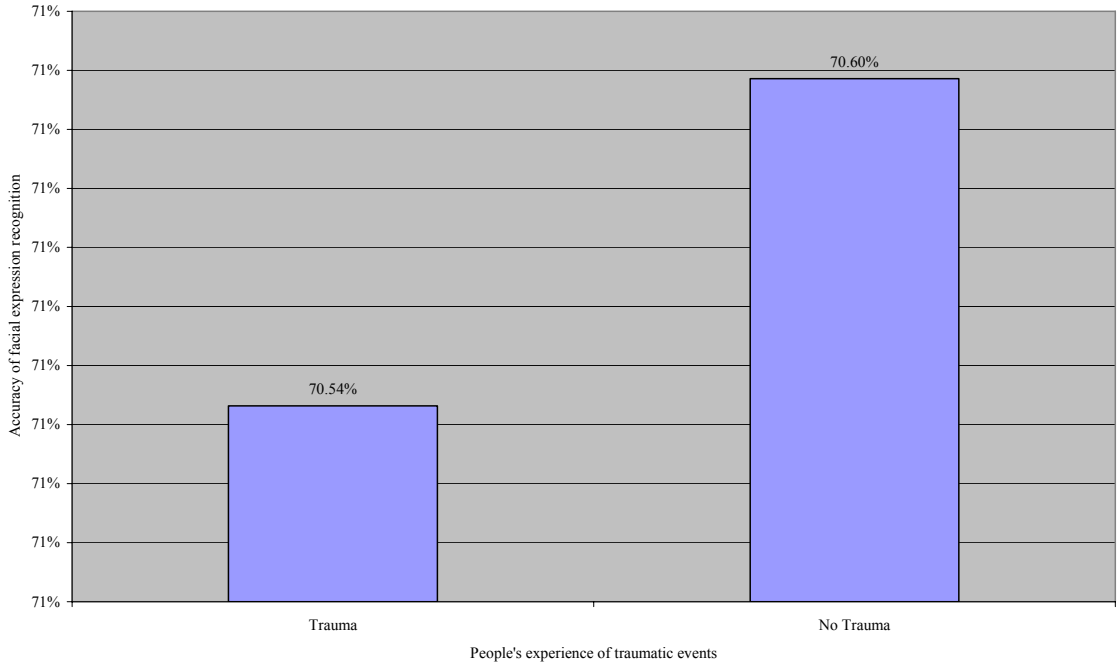


Figure 5: The difference in accuracy of results for facial expressions between people who experienced traumatic events versus people who did not experience traumatic events

With a more comprehensive investigation into state anxious individuals who experienced traumatic events versus state anxious people who had not experienced traumatic events, the following was revealed:

- There is 94% confidence in difference in accurate identification of facial expression for high state anxious people who have experienced traumatic events versus low state anxious people who have experienced traumatic events. (F(153,142) = 0.06, therefore 94% confidence).
- There is a statistically significant difference in accurate identification of facial expressions for all:
  - ❖ low {F(142,27)=0.02, therefore 98% confidence}

- ❖ medium {F(265,35)=0.07, therefore 93% confidence}
- ❖ and high {F(153,9)=0.15, therefore 85% confidence}

levels of state anxiety between people who have experienced traumatic events versus those state anxious individuals who have not experienced traumatic events.

- Across all levels of state anxious individuals, medium state anxious individuals who have not experienced traumatic events are most accurate in identifying correct facial expressions. Those who are least accurate in identifying correct facial expressions are those with low state anxiety who have not experienced traumatic events and those with high state anxiety who have also not experienced traumatic events.

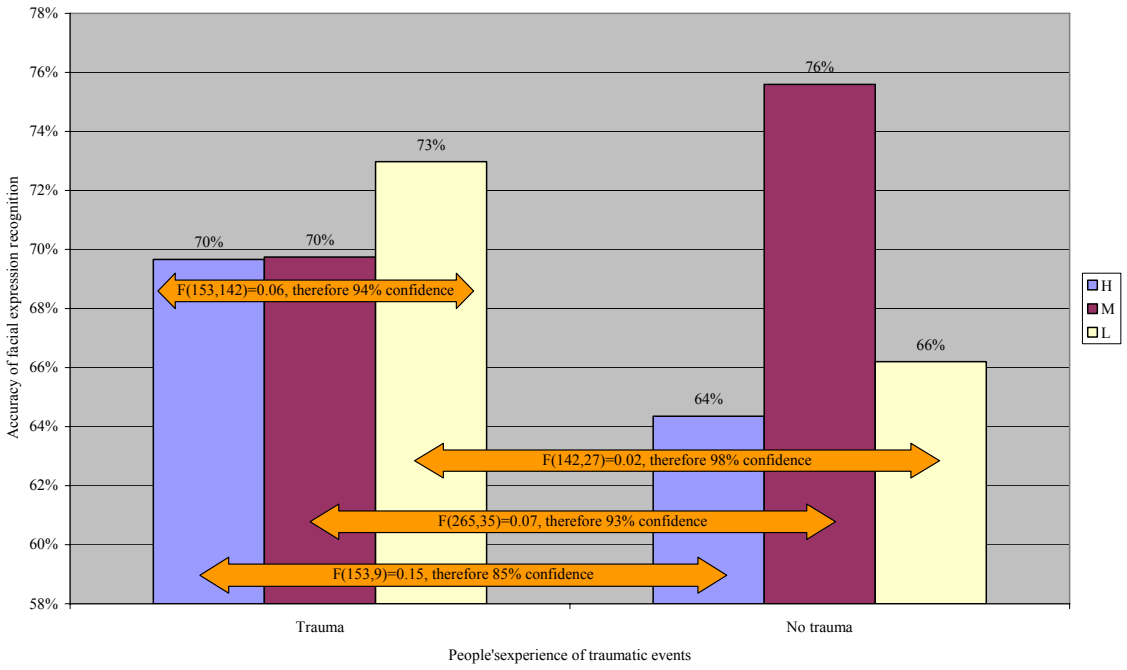


Figure 6: The difference in accuracy of results for facial expressions between different levels of state anxious people who experienced traumatic events versus different levels of state anxious people who did not experience traumatic events

In the same way when trait anxious individuals who experienced traumatic events were compared to those trait anxious people who had not experienced traumatic events, the following indicators were found:

- There is 99% confidence in difference in accurate identification of facial expression for high trait anxious people who have experienced traumatic events versus low trait anxious people who have experienced traumatic events. ($F(158,142) = 0.01$, therefore 99% confidence).
- There is 97% confidence in difference in accurate identification of facial expressions for low trait anxious people who have experienced traumatic events versus low trait anxious people who have not experienced traumatic events. ($F(142,30) = 0.03$, therefore 97% confidence).
- Across all levels of trait anxious individuals, low trait anxious people who have experienced traumatic events are most accurate in identifying correct facial expressions. The least able in accurately identifying correct facial expressions are low anxious individuals who have experienced no traumatic events.

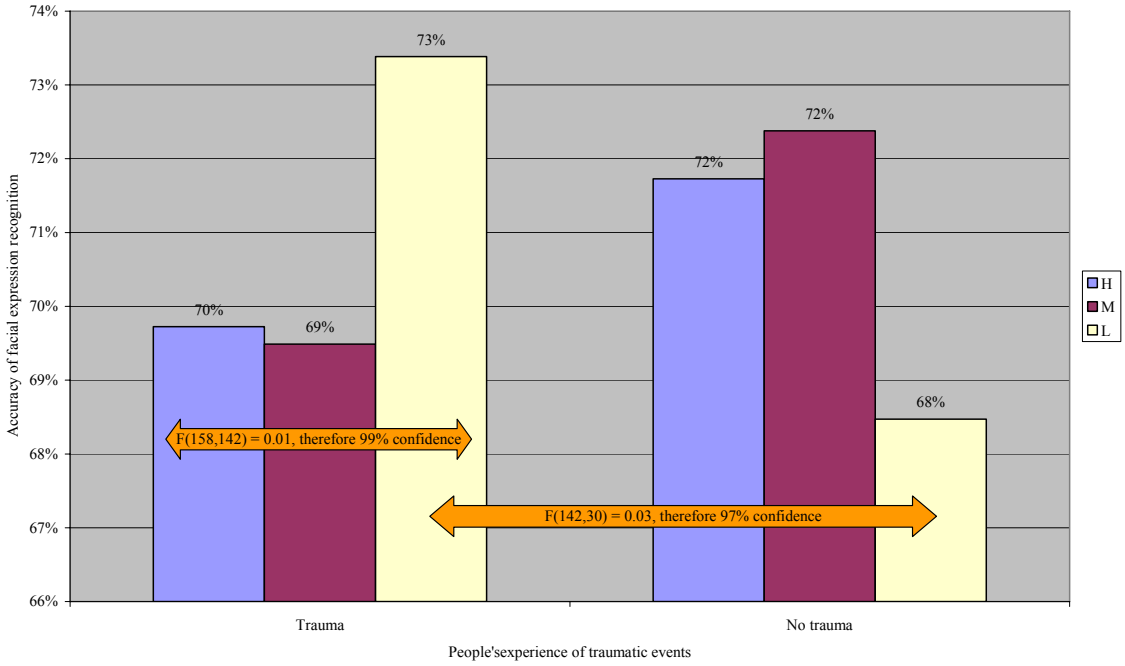


Figure 7: The difference in accuracy of results for facial expressions between different levels of trait anxious people who experienced traumatic events versus different levels of trait anxious people who did not experience traumatic events

With regards to specific analysis on the types of faces that were identified by state anxious individuals, the following indicators were noted:

- There are statistically significant differences on the 85% confidence level for (⟺):
  - ❖ Happy faces for high state anxious people who have experienced traumatic events versus those high state anxious people who have not experienced traumatic events. High state anxious individuals who have not experienced traumatic events appear to identify happy faces more accurately.
  - ❖ Sad faces for high state anxious people who have experienced traumatic events versus those high state anxious people who have not experienced traumatic events. High

state anxious individuals who have experienced traumatic events appear to identify sad faces more accurately.

- ❖ Happy faces for medium state anxious people who have experienced traumatic events versus those medium state anxious people who have not experienced traumatic events. Medium state anxious individuals who have not experienced traumatic events appear to identify happy faces more accurately.
- ❖ Sad faces for medium state anxious people who have experienced traumatic events versus those medium state anxious people who have not experienced traumatic events. Medium state anxious individuals who have not experienced traumatic events appear to identify sad faces more accurately.
- ❖ Happy faces for low state anxious people who have experienced traumatic events versus those low state anxious people who have not experienced traumatic events. Low state anxious individuals who have experienced traumatic events appear to identify happy faces more accurately.
- ❖ Sad faces for low state anxious people who have experienced traumatic events versus those low state anxious people who have not experienced traumatic events. Low state anxious individuals who have experienced traumatic events appear to identify sad faces more accurately.

When comparing responses of correctly identified types of facial expressions between high state anxious people and low state anxious people the following results were found:

- There is a statistically significant difference above the 85% confidence level for ():

- ❖ Happy faces for high state anxious people who have experienced traumatic events versus those low state anxious people who have experienced traumatic events.

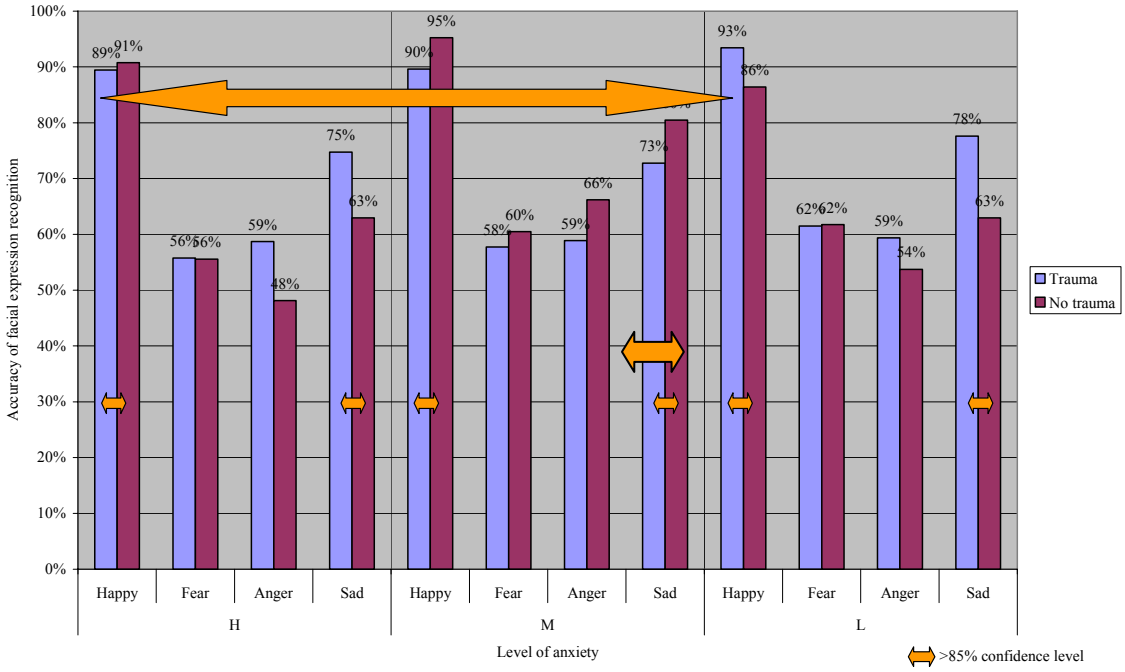


Figure 8: The difference in accuracy of results for specific facial expressions between different levels of state anxious people who experienced traumatic events versus different levels of state anxious people who did not experience traumatic events

With a specific analysis on the types of faces that were correctly identified by trait anxious individuals, the following indicators were noted:

- There are statistically significant differences above the 85% confidence level for (⟺):
  - ❖ Sad faces for high trait anxious people who have experienced traumatic events versus those high trait anxious people who have not experienced traumatic events. High trait

anxious individuals who have not experienced traumatic events appear to identify sad faces more accurately.

- ❖ Fearful faces for medium trait anxious people who have experienced traumatic events versus those medium trait anxious people who have not experienced traumatic events. Medium trait anxious individuals who have not experienced traumatic events appear to identify fearful faces more accurately.
- ❖ Angry faces for low trait anxious individuals who have experienced traumatic events versus those low trait anxious people who have not experienced traumatic events. Low trait anxious individuals who have experienced traumatic events appear to identify angry faces more accurately.

When comparing responses of correctly identified types of facial expressions between high trait anxious people and low trait anxious people the following results were found:

- There are statistically significant differences above the 85% confidence level for ():
  - ❖ Happy faces
  - ❖ Fearful faces
  - ❖ Angry faces

  for high trait anxious people who have experienced traumatic events versus those low trait anxious people who have experienced traumatic events.

In conclusion, state anxiety accentuates differences more than trait anxiety when comparing results between people who have experienced traumatic events versus those people who have not experienced traumatic events.

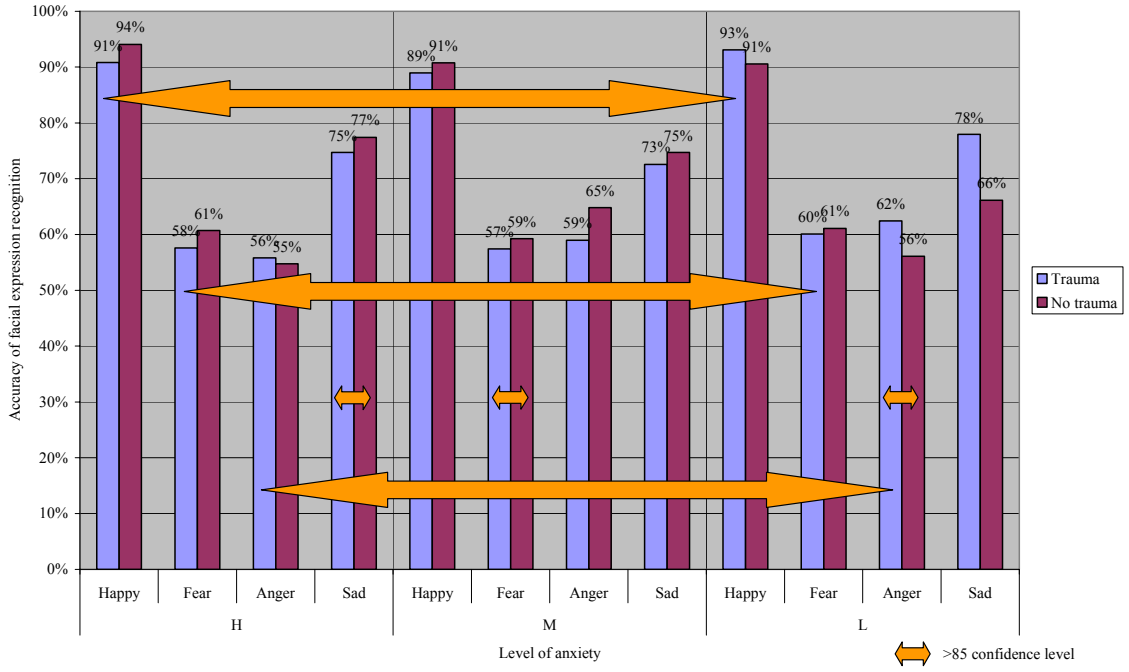


Figure 9: The difference in accuracy of results for specific facial expressions between different levels of trait anxious people who experienced traumatic events versus different levels of trait anxious people who did not experience traumatic events

4. Discussion and conclusion

The following section will focus on discussing results regarding trauma. It will then deal with the null hypothesis by considering results on trauma and anxiety in Table 4 and Table 5. Thereafter alternative hypothesis 2 (H2) and alternative hypothesis 3 (H3) will be discussed when reflecting on results of the accuracy of facial expression recognition in state and trait anxious people (Figure 3and Figure 4). Lastly alternative hypotheses 4, 5, 6 and 7 (H4, H5, H6 and H7) dealing with trauma, anxiety and the interpretation of facial expressions will be discussed with reference to Figure 6, Figure 7, Figure 8 and Figure 9.

4.1. Trauma

When comparing this study to the study conducted by Hoffmann (2002), both sets of data conclude that South African students have experienced a large amount of trauma – despite the fact that that the studies were conducted approximately six years apart. However the present study extends Hoffmann's (2002) research in that it also looks at how these traumatic events that are experienced by participants are related to participants' anxieties and to how participants interpret facial expressions. In comparing only the traumatic events experienced by participants in the present study versus responses in the Hoffmann (2002) study, the following contrasts were made:

Hoffman (2002) used a sample group of 245 (n = 245) students from Technikon Pretoria and the present study had 632 (n = 632) university student participants. Both studies indicated that the most frequent traumatic event category is people having experienced trauma from the death of a

very close friend or family member who may have died due to an accident, homicide or suicide (In Hoffmann 42.4% of sample; in present study 47.6% of sample). Furthermore similar results were found when students were asked about injury or property damage due to severe weather or either natural or manmade disaster (In Hoffmann 9% of sample; in present study 10% of sample) and when asked about incidents of unwanted sexual activity (In Hoffmann 7.8%; in present study 7.6% of sample). Discrepancies between results of the two studies exist for the categories involving physical attack and injury due to motor vehicle accident. Findings indicated that 8.2% (Hoffmann, 2002) and 21.4% (present study) experienced attack whereas 4.5% (Hoffmann, 2002) and 14.2% (present study) experienced motor vehicle injury respectively.

The above findings are useful as they give an indication of the extent to which university students, in two closely located demographic areas in South Africa, experience traumatic events. The present study therefore supports research conducted by Hoffmann and adds that university students in Johannesburg may experience more traumatic events in terms of being physically attacked and being injured in motor vehicle accidents than do university students in Pretoria.

4.2. Trauma and anxiety

The challenge with researching trauma and linking it to anxiety is that one cannot replicate the effects that trauma has on state anxiety when participants are being assessed in a lecture hall. One would have to induce trauma to ascertain the impact that it has on an individual. Despite this, the data have found that there is a significant relationship between trauma and anxiety by comparing students who have experienced traumatic events to students who have not experienced traumatic events and assessing the differences between their responses on the State

Trait Anxiety Inventory. Thus results indicate that those participants who have experienced traumatic events are more likely to have higher state anxiety than those who have not experienced traumatic events. In conclusion the null hypothesis stating that people who have experienced traumatic events will not have significantly different levels of state anxiety versus those who have not experienced traumatic events was rejected.

This finding is supported by a study conducted by Rosenberg et al. (2008) who researched the effects of exposure to violence using samples of students from the Colleges of Judea and Samaria in Israel. The authors concluded that exposure to violence and terror was related to anxiety. Additionally, the fact that Post Traumatic Stress Disorder is as an anxiety disorder linked to symptoms relating to a traumatic event which occurred some weeks, months or years before onset; suggests that the relationship between trauma and anxiety has been well established. The current study supports these findings.

The present study extended the above analysis and found that those participants who had experienced more traumatic events were more likely to have trait anxiety than those who had not experienced traumatic events. A possible explanation for this is if trait anxiety is "proneness" to anxiety or anxiety with which one is born (Speilberger & Diaz-Guerrero, 1976) then one cannot actually experience more trait anxiety when one has experienced more trauma. Thus one could say that trait anxious people may experience more traumatic events. They may attract negativity to themselves and this hypothesis is supported by the theory of attentional bias which states that anxious people are likely to be drawn to threatening stimuli. This theory is further supported by the study conducted by Ronen et al. (2008, in press) who found that participants with higher trait

anxiety reported a higher level of state anxiety and a higher increase in fears after experiencing trauma.

4.3. The accuracy of facial expression recognition in state and trait anxious people

- *Discussion of alternative hypothesis (H2):* Higher levels of state anxiety will predict the over reporting of fearful, angry and sad facial expressions. Refer to Figure 3: Distributions (in percentages) of responses in answering the DANVA for low and high state anxious participants respectively.
- *Discussion of alternative hypothesis (H3):* Higher levels of trait anxiety will predict the over reporting of fearful, angry and sad facial expressions. Refer to Figure 4: Distributions (in percentages) of responses in answering the DANVA for low and high trait anxious participants respectively.

Alternative hypotheses H2 and H3 are proved invalid. Results indicate that there is no statistically significant difference between high and low state and trait anxious groups of people after both groups have answered questions on the DANVA 2-AF. Thus there is not an over reporting of fearful, angry or sad facial expressions. This result differs from the research conduced by Surcinelli et al. (2006) who suggested that recognition bias in high anxiety participants is specific to fear. The current research concurs with findings from Cooper et al. (2007) who found no anxiety-related differences in emotion perception in facial expressions. This suggests that there may not be an attentional bias for negative stimuli, such as negative

looking facial affect, when high anxious individuals are looking at other people's facial expressions.

It is proposed that there may be a need for context for attentional bias to take place. Research findings indicating the absence of attentional bias with non clinical groups is not an isolated one. For example, in a large number of studies, such as Harris and Pashler (2004) and Mathews and Milroy (1994), researchers found that emotional words failed to capture attention. The current study supports this finding where negative facial expressions failed to attract the attention of participants.

Thus it is proposed that even though attentional bias may be a valid explanation for some anxious individuals to be selectively attentive to negative or threatening stimuli, it may be that those stimuli should be threatening in context for attentional bias to occur. In other words, the emotional words attempting to capture attention in studies conduced by Harris and Pashler (2004) and Mathews and Milroy (1994) may not have caused a bias in attention as the words may have been out of context or meaningless to participants. In the current study, it may have been the fact that the participants did not know the people whose faces were displayed on a screen on the DANVA-2-AF.

This is supported by Mathews and Klug (1993) who stated that anxiety disordered participants were selectively attentive to stimuli that were personally relevant as opposed to stimuli that were emotional. In a non-clinical study, Riemann and McNally (1995) also found that attention was biased towards relevant current concerns versus stimuli that were positive or negative in

emotional relevance. This explanation, however, is opposed to the emotionality hypothesis as described by Martin et al. (1991) which describes anxiety being associated with emotional material in general rather than threat material in particular.

A second finding related to H2 and H3 when exploring the accuracy of facial expression recognition in state and trait anxious people suggests that accurate interpretation is highest for happy faces across all levels of anxiety. This finding is supported by the Cooper et al. (in press, 2008) study where the authors looked at trait anxiety in the recognition of emotional facial expressions. This result was also found in the study done by Surcinelli et al. (2006).The authors concluded that happiness was recognized more accurately than all other emotional expressions. A possible explanation for this is that people are not threatened by seeing a happy facial expression and therefore are more likely to interpret a happy face as looking happy.

4.4. Trauma, anxiety and the interpretation of facial expressions

- *Discussion of alterative hypothesis (H4):* People with higher levels of state anxiety will evidence lower levels of accuracy in interpreting facial expressions. Refer to Figure 6: The difference in accuracy of results for facial expressions between different levels of state anxious people who experienced traumatic events versus different levels of state anxious people who did not experience traumatic events.

Thus this alternative hypothesis is proved as valid as there is a statistically significant difference between high state anxious individuals who have experienced traumatic events versus low state anxious individuals who have also experienced traumatic events. In other words people with

higher levels of state anxiety will evidence lower levels of accuracy in interpreting facial expressions when they have experienced traumatic events. However the hypothesis is not true for people who have not experienced traumatic events as there is no statistical significance between high state anxious individuals who have not experienced traumatic events versus low state anxious individuals who have not experienced traumatic events.

- *Discussion of alternative hypothesis (H5):* People with higher levels of trait anxiety will evidence lower levels of accuracy in interpreting facial expressions. Refer to Figure 7: The difference in accuracy of results for facial expressions between different levels of trait anxious people who experienced traumatic events versus different levels of trait anxious people who did not experience traumatic events.

Thus this alternative hypothesis is not rejected as there is a statistically significant difference between high trait anxious individuals who have experienced traumatic events versus low trait anxious individuals who have also experienced traumatic events. In other words people with higher levels of trait anxiety will evidence lower levels of accuracy in interpreting facial expressions when they have experienced traumatic events. However the hypothesis is not true for people who have not experienced traumatic events as there is no statistical significance between high trait anxious individuals who have not experienced traumatic events versus low trait anxious individuals who have not experienced traumatic events.

It follows that people with higher levels of both state and trait anxiety who have not experienced traumatic events become less accurate at recognizing correct facial expressions once they have

experienced traumatic events. Thus an element within traumatic experience may shed light on these findings. The concept of avoidance may be a possible explanation for results found for H4 and H5. In the context of anxiety vulnerability, traumatic experience and facial expression interpretation, the current data may be in line with studies, such as Cooper et al. (2008, in press) and Koster et al. (2006), examining attentional bias as a function of anxiety in non-selected undergraduates failing to be biased towards threatening facial expressions.

In explaining this, the connection between anxiety and an attentional bias is discussed. Authors such as Eysenck (1997), Mogg and Bradley (1998) and Őhman (1996) predict that high anxiety is associated with a propensity to pay more attention to threatening than to non threatening stimuli. For example, Eysenck's hypervigilance theory explains that vigilance for threat may make anxious people more likely than non anxious individuals to pick up and recognize threat cues in their environments. However, this hypothesis appears to test a well known observation. Repeated exposures to a variety of subjectively threatening, but relatively harmless, stimuli should eventually have some of the following effects: Firstly a reduction of fear through habituation (Ronen et al. 2008 in press) and secondly a dissociation of the feared stimulus either through extinction or through a change in cognitive appraisal (Rohner, 2002).

Furthermore, Rohner (2002) explains that high trait anxious people have a pattern of responding in which they allocate their attention towards a threatening stimulus and later avoid doing so (Mogg & Bradley, 1998). This was also found in a study conducted by Bradley et al. (1997) where socially anxious and depressed participants displayed longer reaction times to probes following negative faces, suggesting that they were selectively avoiding negative faces. This

hypothesis also concurs with the view that having a variety of avoidance behaviors plays an essential role in the maintenance of fears. To illustrate this, the following two studies were conducted and support the theory.

The first one was conducted by Rohner (2002). The researcher used a total of 105 psychology and theology students from the University of Lund in Sweden and divided them into low trait anxious groups and high trait anxious groups. Rohner (2002) showed emotional facial expressions to students and continuously monitored their gaze. Results indicated that for 2000-3000 ms, only high trait – and not low trait students – averted their gaze from angry faces more than they did from happy faces.

The second study illustrates and highlights the possible avoidance strategies that anxious people may use when looking at other people's facial expressions. Yuen (1994) found that participants with high social anxiety who thought that they would have to give a presentation after doing a task showed longer reaction times when looking at negative facial expressions. The authors hypothesized that socially anxious individuals may be avoiding negative faces.

- *Discussion of alternative hypothesis (H6):* State anxious people who have experienced traumatic events will be more accurate in identifying fearful, angry and sad facial expressions versus state anxious people who have not experienced traumatic events. Refer to Figure 8: The difference in accuracy of results for specific facial expressions between different levels of state anxious people who experienced traumatic events versus different levels of state anxious people who did not experience traumatic events.

In light of the present results this hypothesis is only valid for the sad faces in the high and low state anxious groups of individuals where statistical differences are found between those people who had experienced traumatic events versus those who had not. In other words people with high and low state anxiety who have experienced traumatic events seem to be more accurate in identifying sad facial expressions versus those who people with high and low state anxiety who have not experienced traumatic events. There are no significant differences between groups where fearful and angry facial expressions were identified.

- *Discussion of alterative hypothesis (H7):* Trait anxious people who have experienced traumatic events will be more accurate in identifying fearful, angry and sad facial expressions versus trait anxious people who have not experienced traumatic events. Refer to Figure 9: The difference in accuracy of results for specific facial expressions between different levels of trait anxious people who experienced traumatic events versus different levels of trait anxious people who did not experience traumatic events.

From the data in Figure 9, this hypothesis is only valid for the angry faces in the low trait anxious group of individuals where statistical differences are found between people who had experienced traumatic events versus those who had not. In other words people with low trait anxiety who have experienced traumatic events seem to be more accurate in identifying angry facial expressions versus those low trait anxious people who have not experienced traumatic events. This finding is contrary to the results of a study conducted by Fox, Russo, Bowles and Dutton (2001) who found that high anxiety was associated with an attentional bias (or selective

attention) for angry faces. There are no significant differences between groups where fearful and sad facial expressions were identified.

In exploring possible explanations for H6 and H7 the concept of attentional bias may play a role in interpreting facial expressions when traumatic experiences come into play. These findings may be supported by Freud's theory of projection which involves attributing your own unacceptable feelings, thoughts and desires onto someone other than yourself (Freud, 1936). Thus people who have experienced traumatic events may be more accurate in identifying sad faces if they are sad themselves.

4.5. Limitations of the study

4.5.1. Assessment tools

With regards to the set of facial expressions used, the DANVA-2-AF test was readily available. The study might have benefited from using Ekman and Friesen's Pictures of Facial Affect. The advantage of Ekman and Friesen's assessment tool is that there are many facial expressions presented to participants whereas the DANVA-2-AF has only 24 images of faces. However the DANVA-2-AF was preferred as it fitted the present testing format.

Secondly, the fact that the DANVA-2-AF is an older assessment tool may have skewed results by distracting students and leading them to give inaccurate responses. Even though the researcher on the current study stated that the styles and fashions of the people on the DANVA-2-AF photographs looked outdated and a little funny and that facial expression in the old days

still looked like the same facial expression in modern times, the images may have affected results.

Furthermore, in order to interpret facial expressions accurately, a person needs a certain amount of emotional intelligence. The methodological short coming in comparing DANVA-2-AF scores between people who have experienced trauma and those who have not experienced trauma is that those people with no trauma could also have low scores on DANVA-2-AF if their emotional intelligence is not well developed.

Another assessment tool measuring participant's reaction times in indicating whether or not a face looked angry, sad, happy or fearful may have been beneficial. This could have eliminated some extraneous variables that may have interfered with the research. In other words, it would have been more accurate to judge a participant's attentional bias based on his or her reaction time when he or she was to interpret a facial expression (such as research conducted by Bradley & Lang, 1999 and Mathews and Milroy, 1994.) In the current study, participants had a long time to decide what facial expression was being displayed and thus participants may have been influenced by memory, a decision making process and the people sitting next to them in the session.

In terms of the TSS, some participants did not answer the questions appropriately. A few students responded that they had experienced a traumatic event and then would not indicate what they had experienced. Added to this there were certain key words (such as "perpetrator" and "combat") that some participants did not understand. Thus some questionnaires were discarded.

Secondly, qualitative interviews with some of the participants may have helped the researcher to understand their subjective experiences of the trauma that they had experienced. It was valuable to ascertain what traumatic events they had experienced but the traumatic events may not always have been perceived as traumatic.

4.5.2. Procedure

The tasks were administered in groups that may have been too large. Most other studies of the same nature administered attention tasks individually or in small groups. This may have been done to minimize distraction by others. It is likely that even though the researcher instructed the participants to be considerate to others by remaining quiet during the assessment session, the students, in their large groups may have been distracted by each other.

4.6. Recommendations for future research

A possible reason for the slight attention, and not drastic attention, of anxious students to attend to threatening faces may be found in research done by Derryberry and Reed, 2002. The authors used their empirical data and suggested that attentional bias to threat was mostly observed in individuals low in attentional control. Compared to the general population, undergraduates may be relatively good at attentional control in order to perform well academically. This argument is supported by data from recent studies conducted by Yovel and Mineka (2004, 2005). The authors investigated attention and emotional information using the Stroop Task in undergraduate samples. In their research, there were no attentional effects for emotional information in the function of anxiety when this information was presented supraliminally. However, with subliminal presentation on the Stroop Task, interferences for threatening words were found to

correlate with anxiety. In the current study stimuli could be consciously perceived. This may have resulted in the slight inhibition of attention for emotional information. It is therefore recommended that research in the future should incorporate measures of attentional control and researchers could also examine attentional biases for emotional information in samples drawn from the population instead of using undergraduates as participants.

Secondly future studies may benefit from attaining more information regarding the traumas that people have experienced. Researchers could use qualitative interviews or quantitative psychometric measures enquiring about the effects of traumatic events. The current study explored the types of traumatic experiences that were experienced by participants but failed to investigate the impact of these events. It is acknowledged that, among other things, traumatic experiences challenge people's assumptions of their safety in the world and this sort of information may benefit research in the future.

4.7. Conclusion

In answering the research questions, the study concludes that there is a relationship between anxiety and trauma – the more trauma one has experienced, the more anxious the individual will be. It may also be said that a highly anxious individual generally will not be as accurate as a non anxious individual in correctly interpreting an angry, sad, happy or fearful facial expression.

Furthermore this highly anxious individual will not over report negative facial expressions such as those that look angry, sad or fearful. It is proposed that he or she is likely to avoid negative facial expressions as it is possible that the person is using an avoidance behavior in maintaining

his or her own fear. With relatively inconclusive results the current study is inconsistent with the theory of attentional bias that states that threatened individuals are likely to be selectively attentive to negative stimuli. Rather the study found that highly anxious individuals may behave in the opposite way by avoiding negative stimuli.

With the high crime rate in South Africa, it is likely that the many people who have experienced trauma have developed a certain amount of anxiety. These people are then more prone in misinterpreting the facial expressions of others and it seems as though they would rather avoid seeing what people around them want to communicate to them via their facial expressions. Thus South Africans may find it difficult to understand each other and this may contribute towards further violence and crime which then sustains the downward cycle of yet more misunderstanding and more transgression.

References

American Psychiatric Association. (2000). *Diagnostic and Statistical Manual of Mental Disorders IV Text Revision* (DSM IV-TR). Washington DC: American Psychiatric Association.

Aronoff, J. (2006). How we recognize angry and happy emotion in people, places and things. *Cross-Cultural Research, 40(1),* 83.

Barlow, D.H (2004). *Anxiety and its disorders: The nature and treatment of anxiety and panic (2nd Ed)*. London: Guilford Press.

Beck, A.T. (1976). *Cognitive therapy and emotional disorders.* New York: International Universities Press.

Birdswhistell, R.L. (1970). *Kinesics and context.* Philadelphia: University of Pennsylvania Press.

Bower, G.H. (1981). Mood and memory. *American Psychologist, 36*, 129 – 148.

Bradley, B.P., Mogg, K., Millar, B., Bonham-Carter, C., Fergusson, F., Jenkins, J. & Parr, M. (1997). Attentional biases for emotional faces. *Cognition and Emotion, 11*, 25-42.

Bradley, M.M., & Lang, P.J. (1999). Fearfulness and affective picture evaluations of pictures. *Motivation and Emotion, 23*(1), 1-13.

Bradley, B.P., Mogg, K., Falla, S.J., & Hamilton, L. R. (1998). Attentional bias for threatening facial expressions in anxiety: manipulation of stimulus duration. *Cognition and Emotion, 12*(6), 737-753.

Butchart, A. & Kruger, J.(1998). The problem of violence. *UNISA Psychologia, 25(1).*

Butchart,A., & Brown, D.S.O. (1991).Non fatal injuries due to interpersonal violence in Johannesburg – Soweto : incidents, determinants and consequences. *Forensic Science International, 52,* 35-51.

Cameras, L.A., Grow, J.G. & Ribordy, S.C. (1983). Recognition of emotional expression by abused children. *Journal of clinical child psychology, 12.* 325-328.

Coleman, A. (2006). *Oxford dictionary of psychology*. Oxford: Oxford University Press.

Cooper, R.M., Rowe, A.C., & Penton-Voak, I.S. The role of trait anxiety in the recognition of emotional facial expressions. *Journal of Anxiety Disorders* (2008), doi 10.1016/j.janxdis.2007.11.010.

Darwin, C. (1872). *The Expression of the Emotions in Man and Animals*. London: John Murray.

David, H. & Barlow, D.H. (2004). *Anxiety and its Disorders: The nature and treatment of Anxiety and Panic (2nd ed).* London: Guilford Press.

Derryberry, D & Reed, M.A. (2002). Anxiety-Related Attentional Biases and Their Regulation be Attentional Control. *Journal of Abnormal Psychology, 111(2),* 225-236.

Ekman, P., Sorenson, E.R. & Friesen, W.V. (1969). Pan-cultural elements in facial displays of emotions. *Science, 164 (3875),* 86-88.

Ekman, P. (2003). *Emotions revealed: Recognizing faces and feelings to improve communication and emotional life.* New York: Henry Holt and Company.

Ekman, P. (1972). Universals and cultural differences in facial expressions of emotion. In J. Cole (ed.), *Nebraska Symposium on Motivation*, (1971). Lincon, Nebraska: University of Nebraska Press. 207-283.

Ekman, P., & Friesen, W.V. (1976). *Pictures of facial affect*. Palo Alto, CA: Consulting Psychologists Press

Ekman, P., Wallace,V., Friesen, M., O'Sullivan, A., Chan, I., Diacoyanni-Tarlatzis, K., Heider, R., Krause, W., Ayhan, L., Pitcairn, P., Ricci-Bitti, K., Scherer, M., Tomita.L. & Athanase, T. (1987). Universals and cultural differences in the judgments of facial expressions of emotion. *Journal of personality and social psychology. 53 (4),* 712-717.

Elfenbein, H., A. & Ambady. N. (2002). Is there an In-Group Advantage in emotional recognition? *Psychological Bulletin, 128 (2),* 243-249.

Emmett, T. & Butchart, A. (Eds) (2000). KwaZulu-Natal Programme for Survivors of Violence. In *Behind the Mask: Getting to grips with crime and violence in South Africa*. Pretoria: HSRC Publishers

Eysenck, M.W. (1992). *Anxiety: The cognitive perspective*. Hove, England: Erlbaum.

Eysenck, M.W. (1997). *Anxiety and Cognition: A unified theory*. Hove: United Kingdom: Lawrence Erlbaum Associates Ltd.

Fountoulakis, K.N., Papadopoulou, M., Kleanthous, S, Popadopoulou, A., Bizeli, V., Nimatoudis, I., Iacovides, A. & Kaprinis, G.S. (2006). Reliability and psychometric properties of the Greek translation of the State-Trait Anxiety Inventory form Y: Preliminary data. *Annals of General Psychiatry, 5(2).*

Fox, E. (2002). Processing emotional facial expressions: the role of anxiety and awareness. *Cognitive and Affective Behavior, 2(1),* 52 – 63.

Fox, E., Russo, R., Bowles, R., & Dutton, K. (2001). Do threatening stimuli draw or hold visual attention in sub clinical anxiety? *Journal of Experimental Psychology: General, 130*, 681-700.

Freud, S. (1936). *The problem of anxiety*. New York: Norton.

Galea, S., Ahern, J., Resnick, H., Kilpatrick, D., Bucuvalas, M., & Gold,J. (2002). Psychological sequelae of the September 11terrorist attacks in New York City. *The New England Journal of Medicine, 346*, 982–987.

Gibson, K, Swartz, L. & Sandenbergh, R. (2007). *Counseling and Coping*. Cape Town: Oxford University Press.

Gilovich, T. (1993). *How we know what isn't so*: *The fallibility of Human Reason In Everyday Life*. New York: The Free Press.

Hall, C., Gaul, L & Kent, M. (1999). College students' perceptions of facial expressions. *Journal of Perceptual and motor skills, 89(3),* 763-770.

Hall, C.W. (2006). Self-reported aggression and the perception of anger in facial expression photos. *The Journal of Psychology, 140(3),* 255-267.

Hartman, C.R. & Burgess, A.W. (1989). Sexual abuse of children: Causes and consequences. In D. Cicchetti & V. Carlson (Eds). *Child maltreatment: theory and research on the causes and consequences of child abuse and neglect*. New York: Cambridge University Press.

Higgins, E.T. & Bargh, J.A. (1987). Social cognition and social perception. *Annual Review of Psychology, 38,* 369-425.

Hoffmann, W.A. (2002). The incidence of traumatic events and trauma-associated symptoms/experiences amongst tertiary students. *South African Journal of Psychology, 32(4)*, 48-53.

Howell, D. (1992). *Statistical methods for Psychology*. Belmont, CA: Duxbury Press.

Izard, C. (1971). *The Face of Emotion.* New York: Appleton-Century-Crofts.

Janoff-Bulman, R. & Berg, M. (1983). Disillusionment and the Creation of Value: From Traumatic Losses to Existential Gains. *Journal of Social Issues, 22,* 12-34.

Kirsh, S.J., Mounts, J.R.W. & Olczak, P.V. (2006). Violent media consumption and the recognition of dynamic facial expressions. *Journal of interpersonal violence, 21(5),* 571-590.

Koster, E.H.W., Leyman, L., De Raedt, R. & Crombez, G. (2006). Cueing of visual attention by emotional facial expressions: The influence of individual differences in anxiety and depression. *Personality and Individual Differences 41*, 329-339.

LaBarre, W. (1947). The cultural basis of emotions and gestures. *Journal of Personality,16,* 1968-1972.

Lavi, T. (2004). Psychological adjustment following exposure to extreme political violence. Unpublished Doctoral Dissertation, Tel-Aviv University, Tel Aviv.

MacLeod, C., Mathews, A., & Tata, P. (1986). Attentional bias in emotional disorders. *Journal of Abnormal Psychology, 95*, 15-20.

MacLeod, C. & Rutherford, E.M. (1992). Anxiety and the selective processing of emotional information: Mediating roles of awareness, trait and state variables, and personal relevance of stimulus materials. *Behavior research therapy, 30(5),* 479-491.

MacLeod, C., Rutherford, E.M., Campbell, L., Ebsworthy, G. & Holker, L.(2002). Selective Attention and Emotional Vulnerability: Assessing the causal Basis of their association through the experimental manipulation of attentional bias. *Journal of Abnormal Psychology, 111(1),* 107-123.

Maner, J.K., Kenrick, D.T., Becker, V., Robertson, T.E., Hofer, B., Neuberg, S.L., Delton, A.W., Butner, J. & Schaller, M. (2005). Functional projection: How Fundamental Social Motives Can Bias Interpersonal Perception. *Journal of Personality and Social Psychology, 88(1),* 63-78.

Martin, M., Williams, R., & Clark, D. (1991). Does anxiety lead to selective processing of threat-related information? *Behavior Research and Therapy, 29*, 147-160.

Mathews, A. (1990). Why worry? The cognitive function of anxiety. *Behavior research and therapy, 28*, 455 – 468.

Mathews, A., & Milroy, R. (1994). Processing of emotional meaning in anxiety. *Cognition and Emotion, 8*, 535-553.

Mathews, A., & Klug, F. (1993). Emotionality and inference with color-naming in anxiety. *Behaviour Research and Therapy, 31*, 57-62.

Melfsen, S. & Florin, I. (2002). Do socially anxious children show deficits in classifying facial expressions of emotions? *Journal of Nonverbal behavior, 26(2),* 109-127.

Mimi, C. Roberts, M.B., Robin, A. Emsley, M.D., Willem P., Pienaar, M.D., Dan, J. & Stein, M.B (1995). Alcohol disorders amongst abstinent alcohol dependent patients. *Psychiatric Services*, 50, 1359-1361.

Mogg, K., & Bradley, B.P. (1998). A cognitive-motivational analysis of anxiety. *Behavior Research & Therapy, 36*, 809-848.

Norris, F.H. (1992). Epidemiology of trauma: frequency and impact of different potentially traumatic events on different demographic groups. *Journal of Consulting and Clinical Psychology, 60 (3),* 409-418.

Norris, F.H. (1990). Screening for traumatic stress: a scale for use in the general population. *Journal of Applied Social Psychology, 20 (20),* 1704-1718.

Nowicki, S., Glanville, D. & Demertzis, A. (1998). A test of the ability to recognize emotion in the facial expression of African American adults. *Journal of Black psychology, 24(3),* 335-350.

Nowiki, S. & Duke, M.P. (1994). Individual differences in the nonverbal communication of affect: The diagnostic analysis of nonverbal accuracy Scale. *Journal of Nonverbal behavior, 18(1),* 9-25.

Őhman, A. (1996). Preferential preattentive processing of threat in anxiety: Preparedness and attentional biases. In R. Rapee (Ed.), *Current controversies in the anxiety disorders* (pp. 329-343). New York: Guilford Press.

Orsillo, S.M., Batten, S.V., Plumb, J.C., Luterek, J.A. & Roessner, B.M. (2004). An experimental study of emotional responding in women with posttraumatic stress disorder related to interpersonal violence. *Journal of traumatic stress, 17(3),* 241-248.

Richards, A., French, C.C., Calder, A.J., Webb, B., Fox, R., & Young, A. (2002). Anxiety related bias in the classification of emotionally ambiguous facial expressions. *Emotion, 2*(3), 272-287.

Rieckert, J. & Möller, A.T. (2000). Rational emotive behavioral therapy in the treatment of adult victims of childhood sexual abuse. *Journal of rational emotive and cognitive emotional therapy*. *18 (2),* 87-101.

Riemann, B.C. & McNally, R.J. (1995). Cognitive processing of personality relevant information. *Cognition and Emotion, 9,* 325-340.

Rohner, J. (2002). The time-course of visual threat processing: High trait anxious individuals eventually avert their gaze from angry faces. *Cognition and Emotion, 16 (6)*, 873-844.

Ronen, T., Rahav, G., & Appel, N. Adolescent stress responses to a single acute stress and to continuous external stress: Terrorist attacks. *Journal of Loss and Trauma* (2008). Doi 10.1080/15325020390233075.

Rosenberg, A., Heimberg, R.G., Solomon, Z. & Levin, L. (2008). Investigation of exposure-symptom relationships in a context of recurrent violence. *Journal of Anxiety Disorders, 22,* 416-428.

Rosenberg, E.L. (Ed) (1995). Facing the facts – human facial expression. *ProQuest Psychology Journals, 16,* 569.

Schachter, S., & Singer, J. (1962). Cognitive, Social and Physiological Determinants of Emotional State. *Psychological Review, 69(5)*, 379-399.

Schlenger, W. E., Caddell, J. M., Ebert, L., Jordan, B. K., Rourke, K. & M., Wilson, D. (2002). Psychological reactions to terrorist attacks: findings from the national study of Americans' reactions to September 11. *Journal of the American Medical Association,288*, 581–588.

Shalev, A. Y., Freedman, S., Peri, T., Brandes, D., & Sahar, T. (1997). Predicting PTSD in trauma survivors: prospective evaluation ofself-report and clinician-administered instruments. *British Journal of Psychiatry, 170,* 558–564.

Shalev, A. Y., Tuval-Mashiach, R., & Hadar, H. (2004). Posttraumatic stress disorder as a result of mass trauma. *Journal of Clinical Psychiatry*, *65,* 4–10.

Silvia, P.J., Allan, W,. Beauchamp, D.L., Maschauer, E.L. & Workman, J.O. (2006). Biased recognition of happy facial expressions in social anxiety. *Journal of social and clinical psychology, 25(6),* 585-603.

South Africa 2007 Crime and Safety Report as found at: https://www.osac.gov/Reports/report.cfm?contentID=61632 Accessed 10 June 2007.

Spielberger, C.D. & Diaz-Guerrero, R. (Eds). (1976). *Cross-cultural anxiety*. London: John Wiley & Sons.

Sulivan, A., Laurie Ann, L., Kirkpatrick, S., Sue, W, MacDonald, R & Pamelyn, M. (1995). Interpretations of facial expressions of emotion by sexually abused and non-abused girls, *Journal of Child Sexual abuse, 4(1),* 45-63.

Surcinelli, P., Codispoti, M., Montebarocci, O., Rossi, N. & Baldaro, B. (2006). Facial emotion recognition in trait anxiety. *Anxiety Disorders, 20*, 110 – 117.

Tait, R.L. (Ed) (2005). Emotions revealed: Recognizing faces and feelings to improve Communication and emotional life. *The American Journal of Psychoanalysis, 65(4),* 409-411.

United Nations Office on Drugs and Crime, Centre for International Crime Prevention. *United Nations Survey of Crime Trends and Operations of Criminal Justice Systems, covering the period 1998 – 2000*. Accessed 10 June 2007 on http://en.wikipedia.org/wiki/Crime_in_South_Africa.

Wicks-Nelson, R & Israel, A.C. (1997). *Behavior Disorders of Childhood*. New Jersey: Prentice Hall.

Yovel, I., & Mineka, S. (2004). Hierarchical models of emotional disorders and emotion-congruent cognitive biases. *Personality and Individual Differences, 36,* 679-694.

Yovel, I. & Mineka, S. (2005). Emotion-congruent attentional biases: the perspective of hierarchical models of emotional disorders. *Personality and Individual Differences, 38*, 785-795.

Yuen, P.K. (1994). Social anxiety and the allocation of attention: Evaluation using facial stimuli in dot-probe paradigm. Unpublished research project, Department of Experimental Psychology. University of Oxford, Oxford.

Appendix 1: Letter of invitation to participants

SCHOOL OF HUMAN AND COMMUNITY DEVELOPMENT
Private Bag 3, Wits 2050, Johannesburg, South Africa
Tel: (011) 717-4500 Fax: (011) 717-4559
Email: sjvanolst@telkomsa.net

Hello. My name is Sarah van Olst, and I am conducting research for the purposes of obtaining a Masters in Community Counseling Psychology (MACC) at the University of the Witwatersrand. I'm focusing on factors which influence the interpretation of facial expressions. I would like to invite you to participate in this study.

Participation in this research will entail completing a short questionnaire and three activities. Firstly you will be asked a few personal questions such as your age and gender. Then you will answer questions about events that you may or may not have experienced. I will give you an answer sheet and you may answer the questions by placing a cross (x) over the answer that you choose. This exercise will take about 10 minutes. In the third activity you will be asked to read short statements about how you feel. You will respond by coloring in the circle that indicates your response. This task will take about 10 minutes. Finally I will ask you to look at a few pictures of peoples' faces that will be projected in front of you on a screen. After I have shown each face, you will indicate on a multiple choice answer sheet, what facial expression you think was shown by that face. You will place a cross (x) on your desired answer. This exercise will also take about 10 minutes.

Participation is voluntary, and no student will be advantaged or disadvantaged in any way for choosing to complete or not complete the activities. This means that you may withdraw from the research if you choose. While questions are asked about your personal circumstances, no identifying information, such as your name or I.D. number, is asked for, and therefore you will remain anonymous. Your completed questionnaire will not be seen by any person at WITS at any time, and will only be processed by myself.

If you choose to participate in the study please complete the questionnaires in the hand out (stapled pack of answer papers) and finish the activities as carefully and honestly as possible. By doing this, I will assume that you have given your consent to participate in the study. Once you have completed everything, place the hand out face down on the desk in front of the lecture hall. I will collect the these when everyone is finished. This will ensure that no one will have access to the information that you have provided, and will ensure your confidentiality.

While this is a minimal risk study, there is a chance that you may feel mild distress after answering some questions. Please be aware that you can come and speak to me and I will arrange an appropriate session where you may speak about your feelings and thoughts. You may also choose to go directly to the CCDU on campus where psychologists and counsellors are available. You can also phone one of the following two organisations: The Trauma Clinic, Centre for the Study of Violence and Reconciliation, Johannesburg: 011 403 5650 (contact person: Nomfundo) or the Depression and Anxiety Group, Johannesburg: 011 783 1474 (contact person: Sally). The receptionists can assist you in arranging appointments.

Your participation in this study would be greatly appreciated. This research will contribute both to a larger body of knowledge on the way in which people communicate with each other using their facial expressions, as well as how this relates in a South African context.

Kind Regards

Sarah van Olst

Appendix 2: The biographical questionnaire

Please do not remove the staple from this hand out. Answer the first four questions by placing a cross (x) in the appropriate boxes. Then respond by writing in the last four digits of your student number (e.g. 012A).

Are you male or female?	Male	Female							
How old are you?	17-19	20-22	23-25	26-28	29-31	32-40	41-50	51-60	60+
What is your home language?	English	Afrikaans	Zulu	Sotho	Xhosa	Tswana	Other:		
Ethnicity (for statistical purposes only)	African	Indian	White	Asian	Coloured	Other			
Your last four student number digits*									

*Please write down the last four digits of your student number at the top of every one of your answer papers in the spaces provided.

Last four digits of student number:

_____

TSS

Appendix 3: The Traumatic Stress Schedule

Please read the statements below and answer the questions by choosing the answer of your choice. You are required to place a cross (x) over the chosen answer. Write in your answer for question 18.

1	Did anyone ever take or attempt to take something from you by force or threat of force, such as in a robbery, mugging, smash n grab or holdup?	no	yes	0-3 months ago	3-6 months ago	6-12 months ago	12-18 months ago	18-24 months ago	more than 24 months ago
2	Did anyone ever beat you up or attack you?	no	yes	0-3 months ago	3-6 months ago	6-12 months ago	12-18 months ago	18-24 months ago	more than 24 months ago
3	Did anyone ever make you have sex by using force or threatening to harm you? This includes any type of unwanted sexual activity.	no	yes	0-3 months ago	3-6 months ago	6-12 months ago	12-18 months ago	18-24 months ago	more than 24 months ago
4	Did a very close friend or a close family member ever die because of an accident, homicide, or suicide?	no	yes	0-3 months ago	3-6 months ago	6-12 months ago	12-18 months ago	18-24 months ago	more than 24 months ago
5	Have you ever been hijacked or someone very close to you been hijacked?	no	yes	0-3 months ago	3-6 months ago	6-12 months ago	12-18 months ago	18-24 months ago	more than 24 months ago
6	Were you ever in a motor vehicle accident serious enough to cause injury to one or more passengers?	no	yes	0-3 months ago	3-6 months ago	6-12 months ago	12-18 months ago	18-24 months ago	more than 24 months ago
7	Did you ever serve in combat?	no	yes	0-3 months ago	3-6 months ago	6-12 months ago	12-18 months ago	18-24 months ago	more than 24 months ago
8	Did you ever suffer injury or extensive property damage because of fire?	no	yes	0-3 months ago	3-6 months ago	6-12 months ago	12-18 months ago	18-24 months ago	more than 24 months ago
9	Did you ever suffer injury or property damage because of severe weather or either a natural or manmade disaster?	no	yes	0-3 months ago	3-6 months ago	6-12 months ago	12-18 months ago	18-24 months ago	more than 24 months ago

10	If a perpetrator was involved, did you know him or her before the incident?	Yes	No
11	Was the perpetrator male or female?	M	F
12	Have you had any counseling for this incident or any of the abovementioned trauma?	Yes	No
13	For how long did you attend counseling for this incident or abovementioned trauma?		

Last four digits of student number: _____

STAI 1

Appendix 4: The State Trait Anxiety Inventory

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you feel *right* now, that is, *at this moment*. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	NOT AT ALL	SOMEWHAT	MODERATELY SO	VERY MUCH SO
1. I feel calm	①	②	③	④
2. I feel secure	①	②	③	④
3. I am tense	①	②	③	④
4. I feel strained	①	②	③	④
5. I feel at ease	①	②	③	④
6. I feel upset	①	②	③	④
7. I am presently worrying over possible misfortunes	①	②	③	④
8. I feel satisfied	①	②	③	④
9. I feel frightened	①	②	③	④
10. I feel comfortable	①	②	③	④
11. I feel self-confident	①	②	③	④
12. I feel nervous	①	②	③	④
13. I am jittery	①	②	③	④
14. I feel indecisive	①	②	③	④
15. I am relaxed	①	②	③	④
16. I feel content	①	②	③	④
17. I am worried	①	②	③	④
18. I feel confused	①	②	③	④
19. I feel steady	①	②	③	④
20. I feel pleasant	①	②	③	④

Last four digits of student number:

STAI 2

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you *generally* feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel.

	ALMOST NEVER	SOMETIMES	OFTEN	ALMOST ALWAYS
21. I feel pleasant	①	②	③	④
22. I feel nervous and restless	①	②	③	④
23. I feel satisfied with myself	①	②	③	④
24. I wish I could be as happy as others seem to be	①	②	③	④
25. I feel like a failure	①	②	③	④
26. I feel rested	①	②	③	④
27. I am "calm, cool, and collected"	①	②	③	④
28. I feel that difficulties are piling up so that I cannot overcome them	①	②	③	④
29. I worry too much over something that really doesn't matter	①	②	③	④
30. I am happy	①	②	③	④
31. I have disturbing thoughts	①	②	③	④
32. I lack self-confidence	①	②	③	④
33. I feel secure	①	②	③	④
34. I make decisions easily	①	②	③	④
35. I feel inadequate	①	②	③	④
36. I am content	①	②	③	④
37. Some unimportant thought runs through my mind and bothers me	①	②	③	④
38. I take disappointments so keenly that I can't put them out of my mind	①	②	③	④
39. I am a steady person	①	②	③	④
40. I get in a state of tension or turmoil as I think over my recent concerns and interests	①	②	③	④

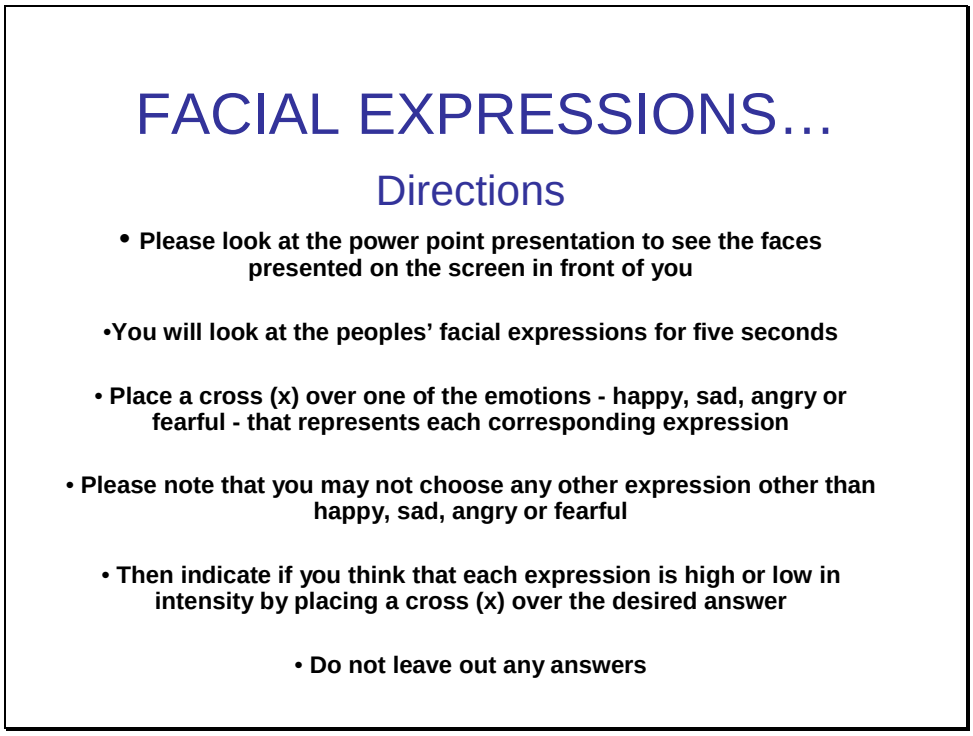
Appendix 5: The Diagnostic Analysis of Nonverbal Accuracy 2 Test

Please look at the power point presentation to see the facial expressions presented on the screen in front of you. You will look at the facial expression for five seconds and then you will place a cross (x) over the one emotion (happy, sad, angry or fearful) that best represents each corresponding expression. Please note that you may not choose any other expression other than happy, sad, angry or fearful. Then indicate if you think that each expression is high or low in intensity by placing a cross (x) over the chosen answer. Do not leave out any answers.

Item	**Emotion**				**Intensity**	
E.g.	Choose if you think the face looks: **Happy** or **Sad** or **Angry** or **Fearful**				Choose if you think the expression looks **high** or **low** in intensity	
1	Happy	Sad	Angry	Fearful	High	Low
2	Happy	Sad	Angry	Fearful	High	Low
3	Happy	Sad	Angry	Fearful	High	Low
4	Happy	Sad	Angry	Fearful	High	Low
5	Happy	Sad	Angry	Fearful	High	Low
6	Happy	Sad	Angry	Fearful	High	Low
7	Happy	Sad	Angry	Fearful	High	Low
8	Happy	Sad	Angry	Fearful	High	Low
9	Happy	Sad	Angry	Fearful	High	Low
10	Happy	Sad	Angry	Fearful	High	Low
11	Happy	Sad	Angry	Fearful	High	Low
12	Happy	Sad	Angry	Fearful	High	Low
13	Happy	Sad	Angry	Fearful	High	Low
14	Happy	Sad	Angry	Fearful	High	Low
15	Happy	Sad	Angry	Fearful	High	Low
16	Happy	Sad	Angry	Fearful	High	Low
17	Happy	Sad	Angry	Fearful	High	Low
18	Happy	Sad	Angry	Fearful	High	Low
19	Happy	Sad	Angry	Fearful	High	Low
20	Happy	Sad	Angry	Fearful	High	Low
21	Happy	Sad	Angry	Fearful	High	Low
22	Happy	Sad	Angry	Fearful	High	Low
23	Happy	Sad	Angry	Fearful	High	Low
24	Happy	Sad	Angry	Fearful	High	Low

Appendix 6: The Diagnostic Analysis of Nonverbal Accuracy 2 presentation

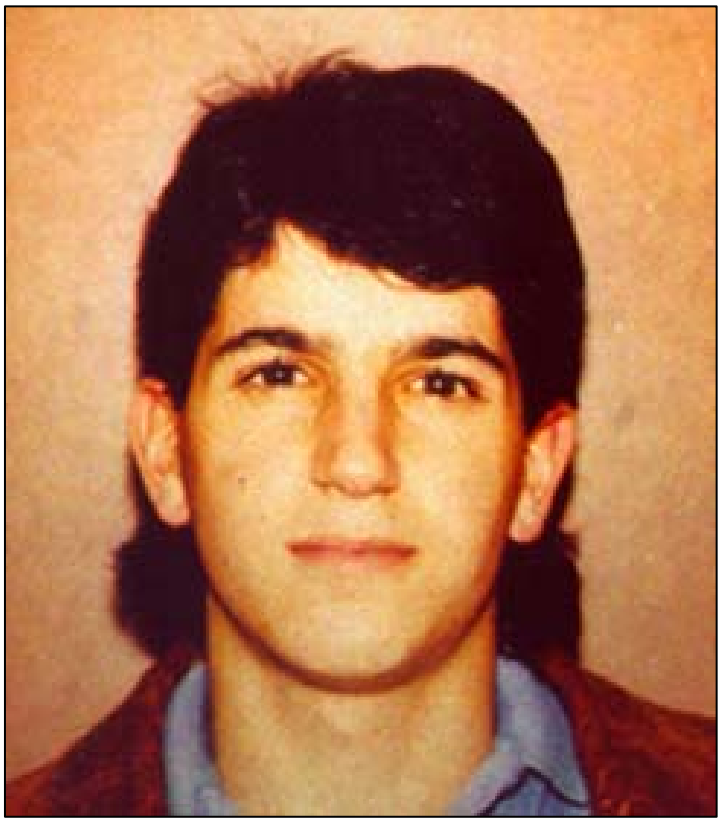
These images were displayed one by one. Time interval was five seconds between each picture. Between images a black, blank screen was displayed so that participants could write down their answers.



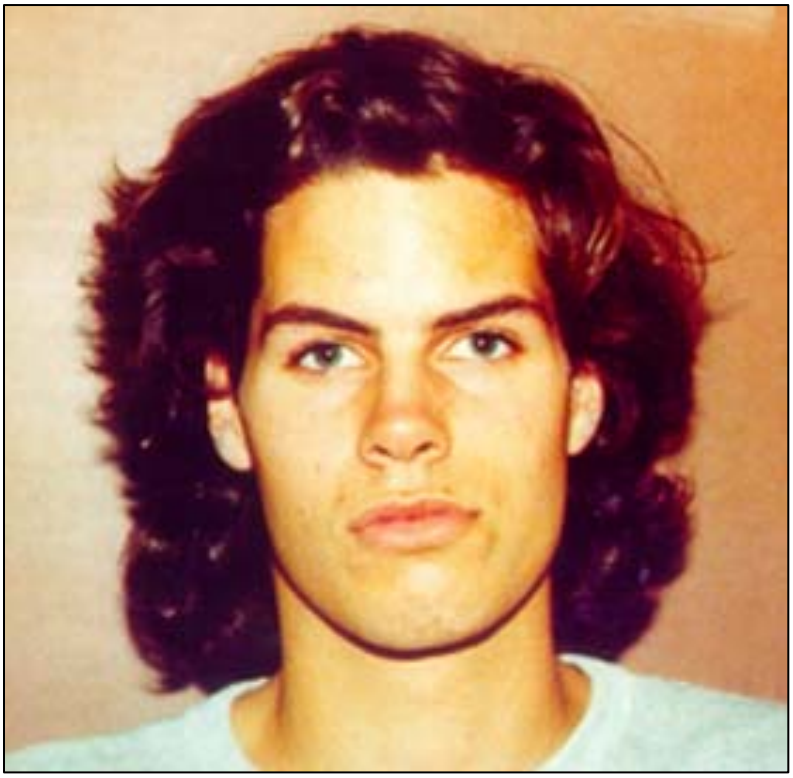
1. Happy

2. Fear

3. Angry



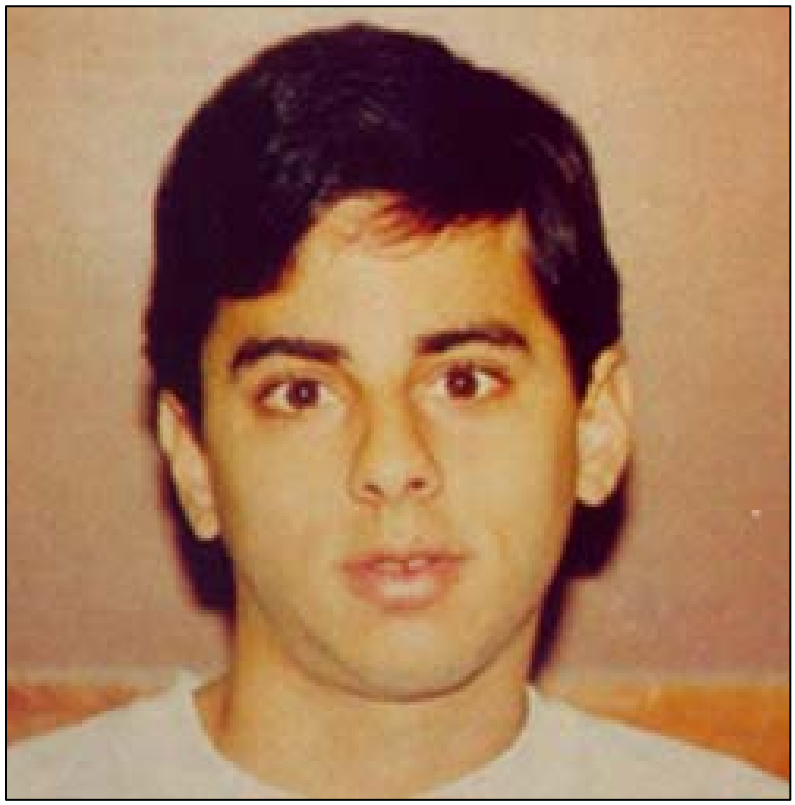
4. Happy



5. Angry

6. Sad

7. Happy



8. Fear

9. Fear

10. Happy

11. Sad

12. Angry

13. Sad

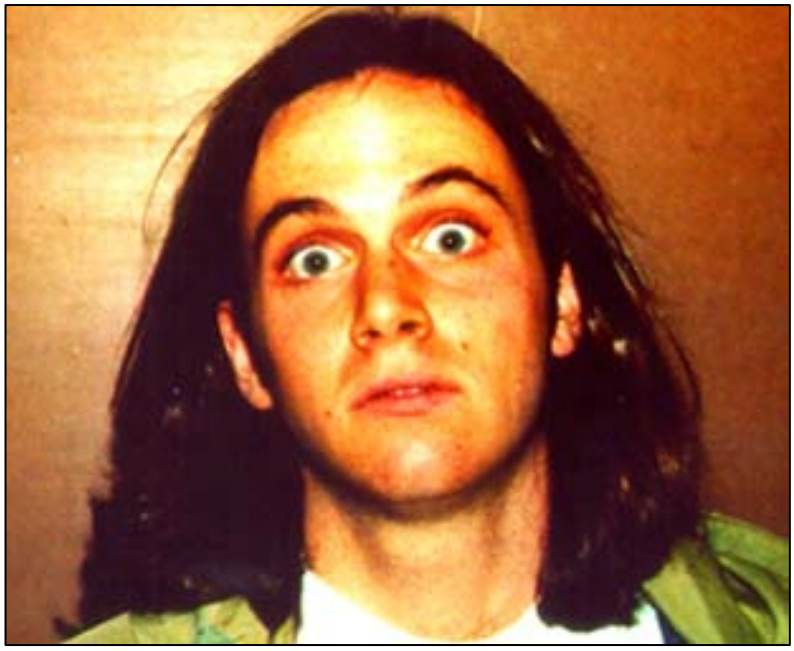
14. Sad

15. Angry

16. Fear

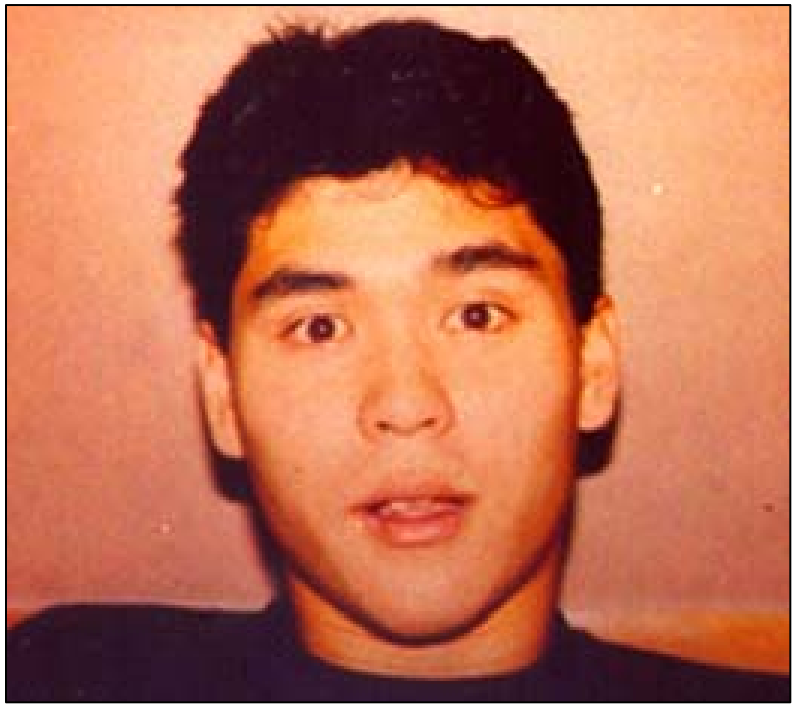
17. Sad

18. Sad

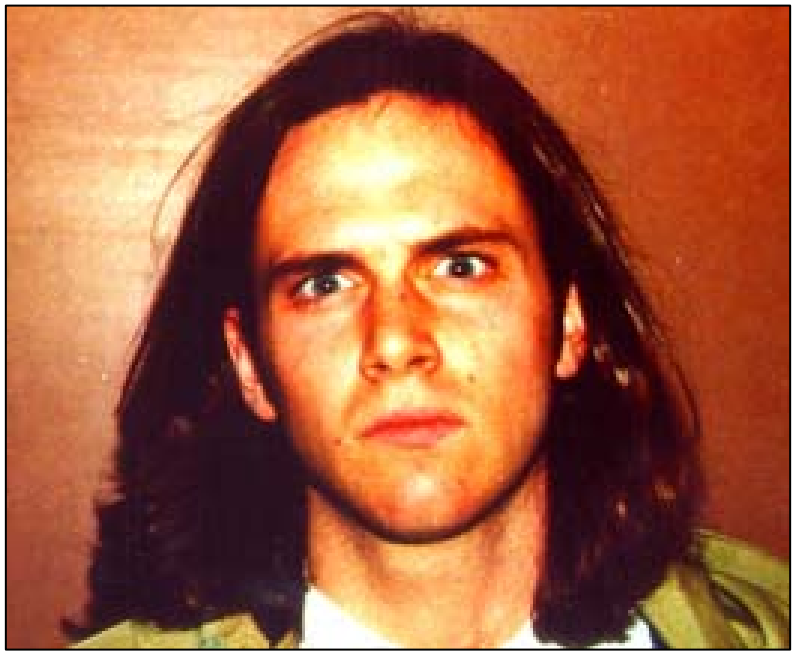


19. Fear

20. Angry

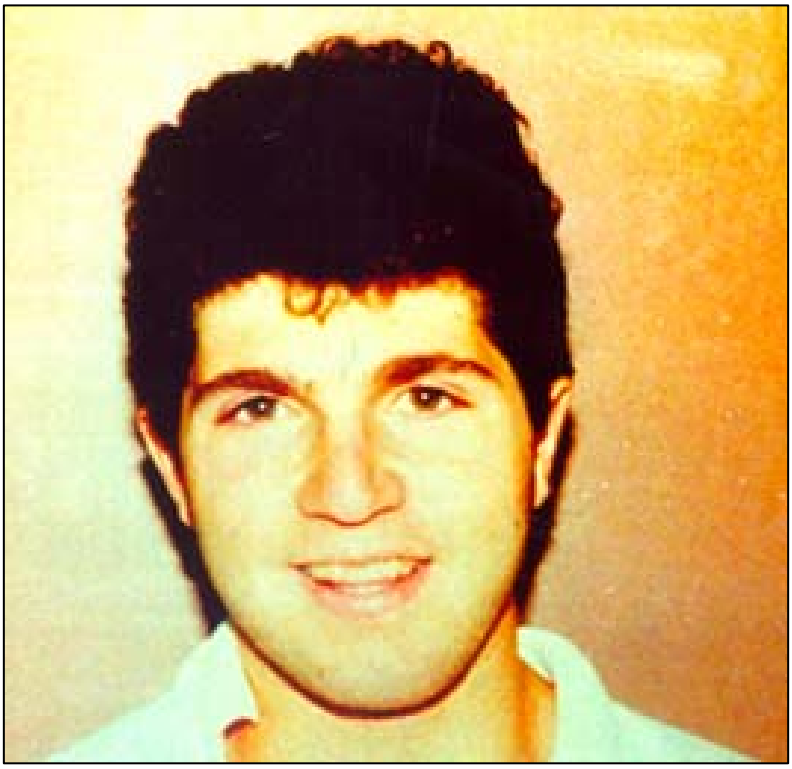


21. Fear



22. Angry

23. Happy



24. Happy

Appendix 7: Ethics approval certificate

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

HUMAN RESEARCH ETHICS COMMITTEE (SCHOOL OF HUMAN & COMMUNITY DEVELOPMENT

CLEARANCE CERTIFICATE	**PROTOCOL NUMBER: MACC/07/002 IH**
PROJECT TITLE:	The interpretation of facial expressions in a South African context.
INVESTIGATORS	Sarah van Olst
DEPARTMENT	Psychology
DATE CONSIDERED	04/07/2007
DECISION OF COMMITTEE*	Approved

This ethical clearance is valid for 2 years and may be renewed upon application

DATE: 17/09/2007

CHAIRPERSON GT Eagle
(Professor GT Eagle

cc Supervisor:

Ms. Esther Price
Psychology

DECLARATION OF INVESTIGATOR (S)

To be completed in duplicate and **one copy** returned to the Secretary, Room 100015, 10th floor, Senate House, University.

I/we fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure be contemplated from the research procedure, as approved, I/we undertake to submit a revised protocol to the Committee.

This ethical clearance will expire on 31 December 2009

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES